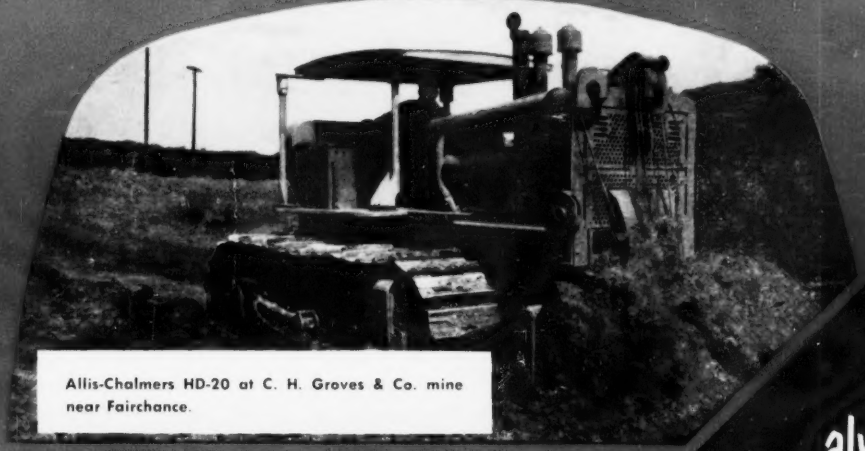
COAL MINING

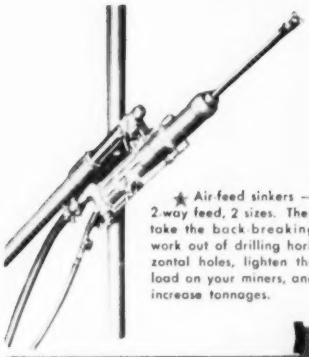
OCTOBER, 1952

published by Modern Mining Publishing Co.
4575 COUNTRY CLUB DRIVE • PITTSBURGH 27, PA.

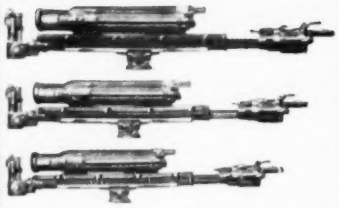
VOLUME 29, No. 10



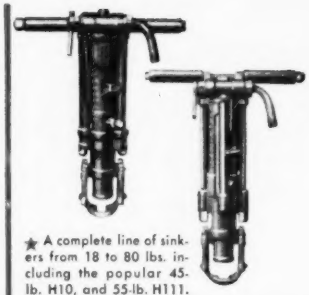
Allis-Chalmers HD-20 at C. H. Groves & Co. mine near Fairchance.



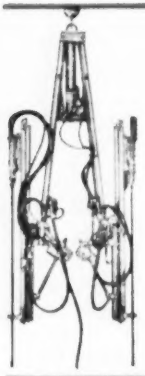
★ Air-feed sinkers — 2-way feed, 2 sizes. They take the back-breaking work out of drilling horizontal holes, lighten the load on your miners, and increase tonnages.



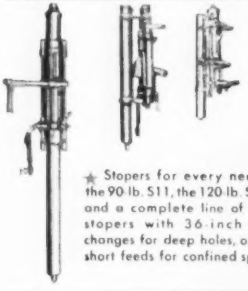
★ Power-feed and hand-cranked drifters. Dependable, powerful, and fast. Ideal for columns and jumbos alike.



★ A complete line of sinkers from 18 to 80 lbs. including the popular 45-lb. H10, and 55-lb. H111.



★ The SDR 34 shaft sinker for faster shaft sinking. Fully closed it's 5'6" between drill centers; open 19'3". All adjustments quickly made with air motor.



★ Stopers for every need — the 90-lb. S11, the 120-lb. SS-22, and a complete line of offset stopers with 36-inch steel changes for deep holes, or with short feeds for confined spaces.

It's Le Roi-CLEVELAND

for

Rock Drills You Can Count On

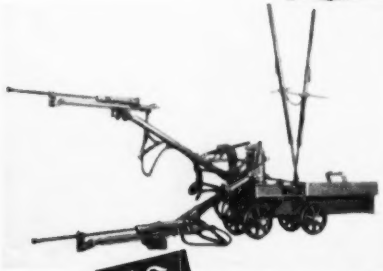
. . . . . fast-drilling, dependable favorites of mining men since 1906

Of course, you know that Le Roi-CLEVELAND builds the popular, easy-holding H10 and H111 sinkers... the fast-drilling PD24, 25, and 14 power feed drifters . . . the S11 and SS22 stopers with trip rotation for easier handling . . . and a mine jumbo that lets you drill out your rounds faster, with greater safety.

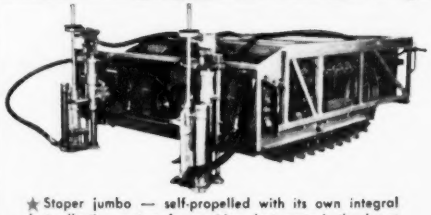
But did you know that Le Roi-CLEVELAND was responsible for some famous "firsts"? Here are a few of them—work-savers that help your miners increase their man-shift production: the air-feed sinker, the offset stoper, the shaft sinker, the stoper jumbo.

So if you have a job of drilling to do—do it with Le Roi-CLEVELAND machines. You can count on them. They're built for speed. And they're built to stay underground, too — where you can use this speed to do more work and cut your costs.

Detailed information about the complete Le Roi-CLEVELAND rock drill line is yours for the asking. Just write us.



★ The famous MDR Jumbo with air-motor poweredbooms for quicker set-ups, greater safety, faster rounds.



★ Staper jumbo — self-propelled with its own integral dust-collection system for positive dust control, the latest thing for roof bolting.

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Plants: Milwaukee, Cleveland and Greenwich, Ohio

Published monthly by Modern Mining Publishing Company. Publication Office—Advance Printing & Litho Co., Erie, Pa. Editorial and Executive Offices—4575 Country Club Drive, Pittsburgh, Pa., P. F. JASIK, Publisher & Editor. Price: In the United States, $2.00 per year; all other countries, $5.00. Single copy, 50 cents. Entered as second-class matter at the Post Office at Pittsburgh, Pennsylvania, under the act of March 3, 1879. Application for reentry applied for at the Post Office at Erie, Pennsylvania.

QUESTION: STRIPPERS, WHAT WILL DO MOST T

ANSWER • • • • •

On most coal stripping operations the cost of hauling can make the difference between profit and loss. And cost of hauling depends on the condition of the hauling roads. A rutted, poorly drained, chuck-holed or boggy road surface requires more hauling units because you cannot use your hauling equipment at maximum economical speeds. Poor roads also cause high maintenance and repair expenses.

• • • • •

A "CAT" MOTOR GRADER ON YOUR JOB WILL

- guarantee smooth, well maintained haul roads.
- increase your tonnage per hour with your present hauling equipment by permitting higher possible hauling speeds.
- cut the profit-consuming costs of blown-out tires, broken springs and axles, twisted frames, and other repair items.
- minimize down-time due to disabled equipment or bad weather.
- do more to increase your hauling production than several new hauling units.

ONE SINGLE NEW MACHINE TO CUT YOUR HAULING COSTS ?

A "CAT" MOTOR GRADER

A "Caterpillar" Diesel No. 212 Grader with 50 h.p. engine cleans coal along high wall for Pyock & Reed on their operation near Stoystown, Pennsylvania. Metal cab and safety glass give operator protection.

THAT'S ALL

THERE'S A SIZE TO FIT YOUR PARTICULAR NEEDS. EACH IS BUILT TO GIVE MAXIMUM PERFORMANCE IN ITS HORSEPOWER RANGE.

No. 12	100 h.p. Price $13,195.00 f.o.b. Peoria, Ill. Weight 22,200 lbs.	No. 212	50 h.p. Price $7,769.00 f.o.b. Peoria, Ill. for tandem drive. Weight 13,670 lbs.
No. 112	75 h.p. Price $11,510.00 f.o.b. Peoria, Ill. Weight 19,880 lbs.	No. 212	50 h.p. Price $6,960.00 f.o.b. Peoria, Ill. for single drive. Weight 11,390 lbs.

Your job will move faster and your tonnage output will grow with a "Caterpillar" Diesel Motor Grader on the job. May we recommend the proper model for your operation?

Special attachments extra

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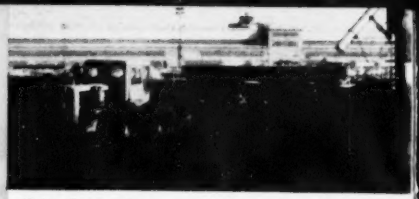
"CATERPILLAR" DIESEL TRACTORS, ENGINES, MOTOR GRADERS, EARTH-MOVING EQUIPMENT • HYSTER WINCHES & CRANES • TRACKSON SHOVELS, PIPE LAYERS • BUCYRUS-ERIE SPUDDERS AND SHOVELS • CHICAGO PNEUMATIC COMPRESSORS & AIR TOOLS • ATHEY WAGONS, MOBILOADERS, FORCE-FEED LOADERS • MARTIN TRAILERS • BRODERICK AND BASCOM WIRE ROPE • McKIERNAN TERRY PILE HAMMERS AND EXTRACTORS.

It's what OWNERS SAY that counts!

rubber-tired Tournadozer earns high praise for performance on variety of jobs . . .



Kaiser-Frazer Corp. uses C Tournadozer for coal handling at its Willow Run, Mich. factory. Rig stockpiles up to 120 tons hourly over 300' distance . . . also feeds 300 tons per shift from stockpile to conveyor for power house bunkers. Maint. & Equip. Supt. C. P. OLSEN reports "C" has been 96% efficient over 4,350 hours. *"It's entirely reliable and of exceptional importance to our job."*

Minneapolis Contractor Carl Bolander & Sons' Tournadozer pays off year around. In summer, it push-loads Tournapulls and dozes dirt . . . in winter, it plows snow. Says IVER BOLANDER of job shown, *"This is one of the toughest clearing jobs New Market Township has ever had. The March snow was the heaviest in years . . . yet our Tournadozer did the work where other units failed."*

IVAN WRIGHT, Peoria, Illinois, stripped 40 ft. of overburden at coal mine near Glasford with this 19 m.p.h. C Tournadozer. Now, after 2,500 hours work with rig, he reports, *"There's not a crawler made that will move the amount of dirt Tournadozer will. You can drive Tournadozer job-to-job as fast as you can move a crawler with a truck. You waste no time loading, unloading or blocking."*

At its Ohio plant, Diamond Portland Cement Co. strips shale year 'round with this C Tournadozer. For plant clean-up, rig runs 3 mi. from pit over asphalt roads in a few minutes . . . also handles shovel clean-up, snowplowing, etc. *"Will move as much shale in ½ day as our crawler can in a full day. It sure has saved us a lot of money in moving costs,"* says Vice Pres. E. R. EVANS.

Lackey & Williams, Nacogdoches, Texas, used their 186 h.p. Tournadozer to stockpile a total of 1000 cu. yds. of road material. On 40-ft. one-way passes the Tournadozer piled 400 cu. yds. of clay and gravel in 5 hours. *"This is the best piece of dirtmoving equipment I have ever operated. It is faster, has more power, and is easier to operate,"* reports Partner N. H. LACKEY.

Lone Star Steel Co., Texas, works this "C" 16 hours per day, 6 days per week . . . replaces 3 crawlers on clean-up at its Daingerfield open pit. *"For our work, where speed, mobility and power are essential, Tournadozer has proved very satisfactory,"* says Division Supt. W. L. KENDRICK. *"It's a fine machine for cleaning around shovels, pushing trucks, and dozing tasks. We are very pleased with its performance."*

Leveling spoil, clearing snow, and handling pit clean-up for West Virginia-Pittsburgh Coal Company mine at Collier, West Virginia, Tournadozer drew high praise from Owner F. A. HOWE. *"It dozes 50% more spoil than a crawler, and is so fast and mobile that we use it to work all 5 of our pits. It saves us 1 to 2 tractors. It does a good job any place we put it."*

See us for more information on how modern Tournadozers can reduce costs and speed completion of your job. We'll also be glad to give you the names and addresses of owners who can tell you more about Tournadozer production advantages.

Tournapull, Tournadozer — Trademark Reg. U. S. Pat. Off. D-113-bw

LET Furnival Machinery Co.

Lancaster Avenue at 54th Street, PHILADELPHIA 31, PA.

Water St., NEW PHILADELPHIA, PENNSYLVANIA (Pottsville Region)

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COAL MINING

Vol. XXIX October, 1952 No. 10

Contents

Published Monthly By

MODERN MINING PUBLISHING COMPANY

Publication Office—1118 Chestnut St., Erie, Pa.

Editorial Offices—4575 Country Club Drive, Pittsburgh, Pa., Phone Pl. 1-9411.

P. F. JASIK, Publisher and Editor

EXTRA-PRODUCTION OPERATIONS EVERYWHERE ATTEST—

The EDISON ELECTRIC CAP LAMP double filament bulb saves hundreds of man hours every year— promotes greater underground safety

Teamwork plays a major role in realizing peak production in today's modern mining methods. And because teamwork relies completely on the availability of *every man,* bulb burn-outs may deal a crippling blow to operations.

Successful mine operators everywhere are finding the answer in the reserve protection of the Edison double filament bulb. A burned-out filament doesn't mean a lost shift for the miner and a short crew for the foreman. A turn of the switch transfers the power of the unfailing Edison battery to the second filament —restores continued, brilliant illumination. Teamwork is maintained, underground safety is assured. And because there is only *one bulb,* located in the *center* of the headpiece, Edison light has the advantage of maximum reflector area.

You'll find it profitable to investigate the production-safety benefits of the Edison double filament bulb.

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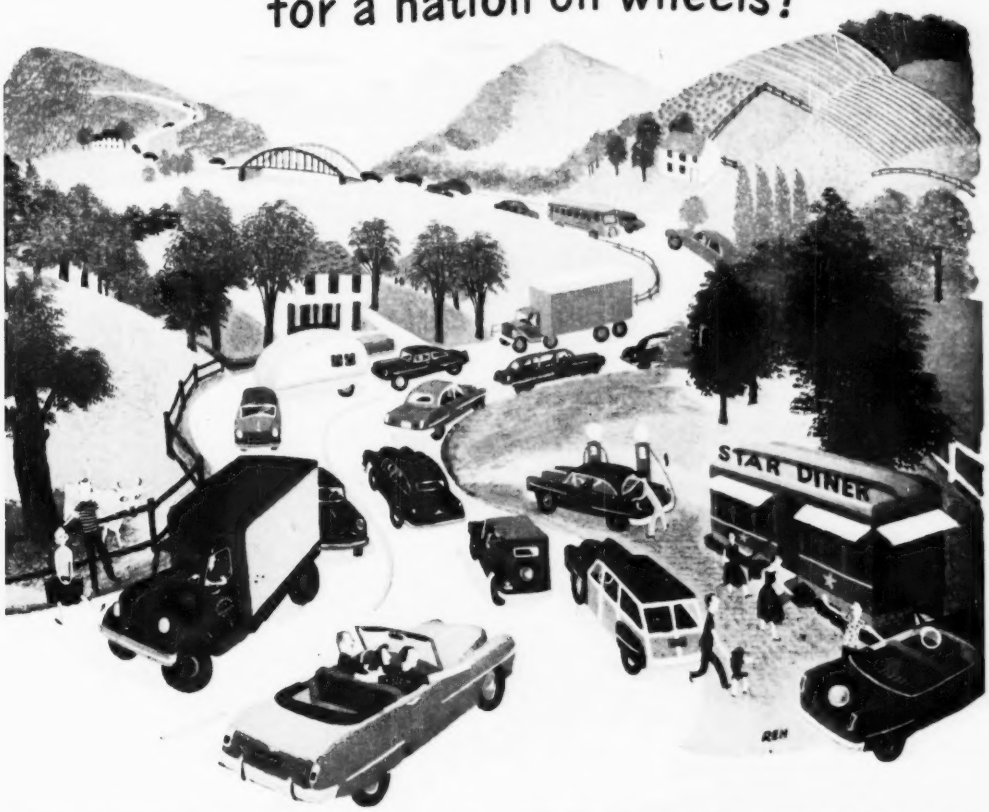
COAL keeps the wheels going round for a nation on wheels!



Your tires turn on a road of coal, for it takes coal to manufacture highway cement and it's coal tar that binds and surfaces the crushed stone base of a "blacktop." Your car and the bridge it crosses are *bituminous* coal "products," too—both are made of steel and to make *every* pound of steel takes the carbon from a pound of coal. Even modern highway lighting depends on coal—70% of the fuel used by America's electric companies is coal. More than that, almost all the fine products that make our standard of living the world's highest depend on coal power for their manufacture!

So it's important to everyone that America's 5,000 competitive coal companies have developed the most efficient coal industry in the world . . . that America's coal resources are virtually inexhaustible!

Are you responsible for choosing the fuel to power a factory—to heat a home, a hospital or any other building? Then you should consider these important

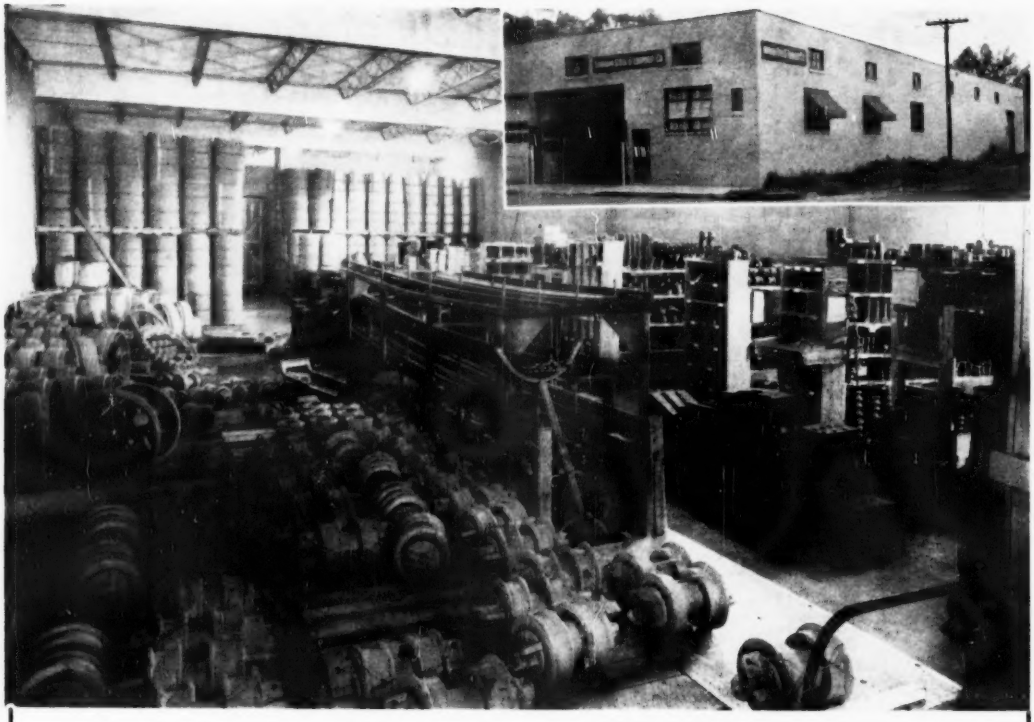
ADVANTAGES OF BITUMINOUS COAL!

- ☆ Lowest-priced fuel almost everywhere!
- ☆ Labor costs are cut with modern boilers and automatic handling equipment!
- ☆ Easiest and safest to store *of all fuels!*
- ☆ Vast reserves make coal's supply dependable!
- ☆ Dependable supply assures price stability!
- ☆ A progressive industry strives to deliver an ever better product at the lowest possible price!

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association, Washington, D. C.

FOR ECONOMY AND DEPENDABILITY

YOU CAN COUNT ON COAL!



Equipment for Coal Strippers

NOW—A new, nearby source of supply for coal strippers located in western Pennsylvania, eastern Ohio, and the northern panhandle of West Virginia

Substantial Stocks of Parts Ready at All Times

ELECTRIC STEEL FOUNDRY COMPANY — ESCO parts for ESCO dippers and dragline buckets. ESCO adapters (two part teeth) for all makes of dippers. ESCO cast manganese cutting edges and alloy steel blade ends for all makes of dozers.

TAYLOR-WHARTON IRON & STEEL COMPANY — TISCO cast manganese steel teeth for all makes of shovel dippers. Repointers and point bars for rebuilding teeth. TISCO crusher jaws. TIMANG welding rod.

INDUSTRIAL PARTS, INC. — Replacement track rollers, idlers, sprocket rims, master pins, and roller guards for Caterpillar D-7 and D-8 tractors.

WEIRTON, W. VA., BRANCH and WAREHOUSE

KANAWHA STEEL & EQUIPMENT COMPANY

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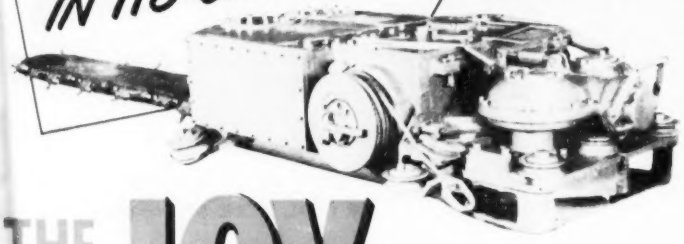
WEIRTON, W. VA.

HOME OFFICE: Charleston, West Virginia

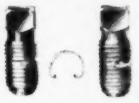
EASIEST HANDLING THIN-SEAM CUTTER IN ITS CLASS!



The JOY Bugduster operates on a non-clogging principle which permits passing large objects such as bits, slate and cap pieces. It eliminates kerf shoveling—frees one man for other duties. What's more, it requires no extra power—operating records show that keeping the cutter chain free of cuttings saves enough power to drive the bugduster.

THE JOY 11-B CUTTER with BUGDUSTER

SULMET CARBIDE BITS with *exclusive* self-locking Set Screws insure lowest bit cost per ton!



Only JOY Shortwall Cutters offer lever control for smooth operation of drum friction clutches. The JOY 11-B Cutter with Bugduster handles easily and smoothly, cuts faster and also saves time in the loading cycle, because the cuttings are piled in an even row for easier mechanical loading. With this cutter, props can be carried close to the face—its short length, low height and narrow width make it the ideal cutter for conveyor mining. On any basis of comparison in its class, the JOY 11-B Cutter with Bugduster will pile up extra profits for you—*let us show you actual performance figures!*

Write for Bulletins or

Consult a Joy Engineer

W&D-CL2940

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Do You Know?

Dynel, a synthetic fabric developed by the Carbide and Carbon Chemicals Company, will not shrink or stretch, is resistant to stains, mildew and destructive insects, sheds wrinkles, holds a press, is fire resistant, chemically resistant and can be dyed many colors.

The diesel engine common on today's railroads may give way to electric engines just as steam engines gave way to diesels, H. F. Brown of the Westinghouse Electric Internation Co. told the American Institute of Electrical Engineers at the Centennial of Engineering.

Mr. Brown said many engineers believe the diesel is an "interim" engine.

"Although its electrical equipment can withstand overloads for short intervals of time," he said, "the diesel engine has fixed maximum capacity which cannot be overloaded and this type of locomotive cannot supply even temporarily the large demands for power for rapid acceleration as can the electric locomotive."

Continued research in electrical engineering should help keep electric power cheap. When combined with the latest developments in electric engines, this should make railroad electrification attractive again because of an overall economy, he said.

Some 200 basic research contracts, totaling more than $2,400,000, have been made with universities by the Office of Ordnance Research of the Army during its first year of operation.

Intended to add to the store of the nation's scientific knowledge upon which the arms and the industry of the future will be based, the center for stimulating and implementing pure or basic research is located near Duke University with a staff of specialized administrators and scientists.

Armed with an adding machine an advanced student at the University of Illinois worked four months analyzing the stresses that would surround a perfectly round bolt hole in a single thickness of metal. But problems such as that are "all in a second's work" for the University's new home-made electronic computer.

With its vacuum tubes and electrons, the machine can spin out answers to such engineering questions as "what would happen to a building of this design if an atomic bomb fell nearby, or if an earthquake rumbled underneath it?" It can figure out what happens when a load moves across a bridge, a problem so complex it never has been analyzed thoroughly.

Under the supervision of Prof. N. M. Newmark, a group at the University's Structural Research Laboratory designed and built the computer. It will be available on a full-time basis for University research.

Here and There in the Coal Industry

● Torrence Stiffler, President of the Stiffler Industrial Lubricants Company, manufacturers of heavy duty coal mine and rolling mill oils and greases, announces plans for building a new modern plant.

Torrence Stiffler

A staff of trained sales engineers will be employed to help solve lubrication problems and to develop new oils and greases for the new types of machines that are coming on the market.

● The Kanawha Coal Operators Association held its annual meeting on October 16 at the Kanawha Country Club, Charleston, W. Va. The meeting was well attended with a business session in the afternoon and a banquet in the evening.

During the business session, the members heard talks by Tom Pickett, Executive Vice President of NCA; Joseph E. Moody, President of the Southern Coal Producers Association; Henry Lammers, Secretary of the Coal Producers Committee for Smoke Abatement; Wm. Haddox, Property Owners Committee; R. C. Andrews, Secretary of the West Virginia Coal Association, and Robert Kelly, legal counsel of the Kanawha group. C. C. Dickinson, Jr., who was President of the Association, presided at the business session during which officers were elected. Mr. Kelly acted as toastmaster at the banquet during which Mr. Moody and Mr. Pickett spoke.

● Gilbert E. Gilroy, President of the Bair-Collins Company, Roundup, Montana. Died at the age of 58.

● The Department of Mining Engineering of Lehigh University last week conducted a three-day inspection trip through the Western Pennsylvania bituminous coal mining areas. The 28 students making the trip visited the Robena Mine of the United States Steel Co., No. 32 Mine of Bethlehem Steel Co., and the Portage Mines of Johnstown Coal & Coke Co.

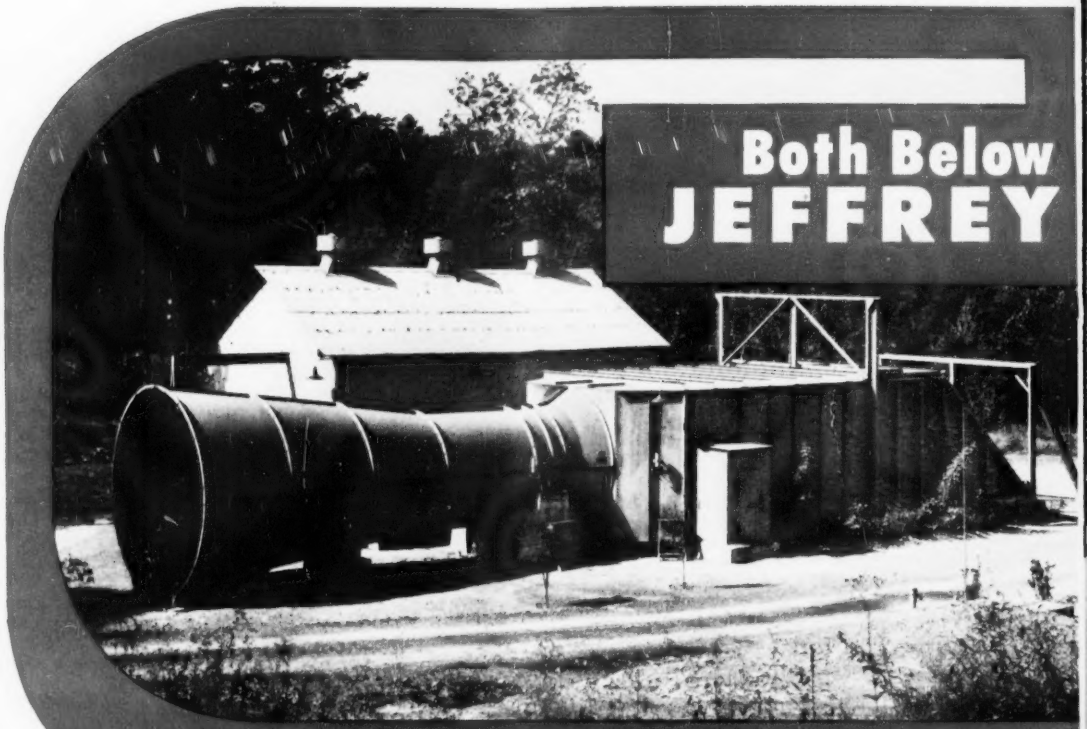
The University is to be congratulated on making available this opportunity for its students to actually see engineering in action.

● The Operators Association of Williamson Field and the Upper Buchanan Smokeless Operators Association held their annual meetings at Williamson, W. Va., on October 17. It was the 28th annual meeting of the Williamson group. Tom Pickett, Executive Vice President of the National, was a special guest at the meeting.

Officers of the Williamson Operators Assn. elected at the meeting included: President, J. M. Tulley; Vice President, Harry S. Gay; Treasurer, J. D. McLaughlin; and Secretary, Joseph J. Ardigo. Directors named were: R. C. Penny, C. W. French, C. A. Hamill, E. S. Hamilton, R. D. Jones, Zach Justice, D. H. Morton, I. J. Richardson, Paul D. Ritter, Frank P. Smith, Laurence E. Tierney, Jr., and W. W. Walker.

The Upper Buchanan Association also elected officers as follows: C. A. Hamill, President; J. W. Strickler, Vice President; Joseph J. Ardigo, Secretary-Treasurer, and Paul D. Ritter and J. M. Tulley, Directors.

● According to a recently issued statement from the Maryland Bureau of Mines, prospectors digging in the bituminous coal seams near cumberland, Md., have discovered deposits of Germanium, a rare and valuable mineral used in electronic equipment. Quantities of the rare mineral have previously been located in the ashes of some of the coals mined in West Virginia. The mineral deposits were located in the Georges Creek coal mining section. Tests are now being made to ascertain whether the mineral occurs in sufficiently rich deposits to make it commercially valuable.



Engineered Ventilation with Jeffrey AERODYNE Fans

Efficient mine ventilation requires a complete understanding of the operating conditions plus high-volume equipment flexible enough to meet specific requirements.

Each Jeffrey AERODYNE Fan installation is engineered for the job it is intended to do. Easy adjustment of the fan blades is an important feature—a large number of positions are available for an extremely wide range of operation.

View above shows a type 8H-96 AERODYNE Fan used for ventilating a large mine in Alabama. It is providing modern, efficient ventilation.

Fans are available for blowing or exhausting, depending upon your needs. Consult a Jeffrey engineer on your ventilation requirements.

Coal Drying by Heat

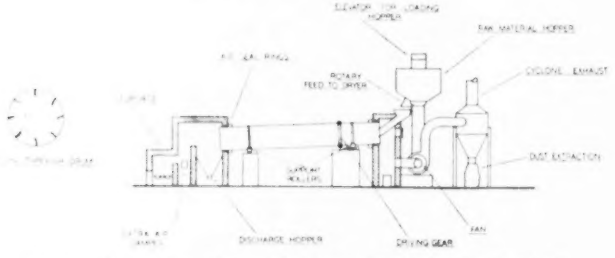
By a Special Correspondent

PART I

• Thermal drying of coal varies considerably in the methods and appliances used according to the coal-producing country. Where freezing of washed coals becomes troublesome, or where long distance transport is required, heat drying of coal is applied, especially to lignite coals, which latter require reduction of inherent moisture content from 60 to 10% as a necessary step for briquetting. Drying also assists the various processes of screening, dry cleaning or dust removal. Drying may also be necessary for carbonization, for milling prior to burning in pulverized form under boilers or in industrial furnaces. Last but not least long haulage of wet coal can be made more economical by eliminating the loosely bound "free moisture" from the surface.

Fig. 1

Single — Shell Rotary Drier.



Courtesy R. R. Clegg (Journal Institute of Fuel, London, England).

Commercial drying deals usually only with the latter, for example acquired during washing, or during spraying for dust suppression. It is economical and safer to dry down to, say 1 to 2% above the "air-dry" condition, which latter depends on relative air humidity and temperature. In hot air or gas drying, usually three distinct stages are encountered: (1) a constant rate drying phase, where surface moisture is evaporated, i.e., boiled off due to application of heat; (2) a primary falling-rate phase with decreasing rate of surface moisture evaporation, and (3) a secondary falling-rate phase which brings out the "inner" moisture, i. e., water bound mechanically to the smallest particles of the coal.

The main drying factors are: (a) Initial moisture content. Any mechanical means to reduce same are advantageous for thermal drying. (b) the final moisture desired. In view of the fact that high requirements not only increase size and first installation cost of the drying plant, but also prolong drying time and increase the cost of labor and fuel, requirements should be kept moderate. (c) Coal porosity and other physical conditions influence the rate of drying for a given drying temperature and gas humidity, and for a given gas speed (volume) within the dryer. To this come (d) chemical factors, for example surface oxidation and decomposition, and also inflammability. Lignites will therefore require indirectly heated hot air dryers, and other coal qualities might cut out the use of counter current, where the hottest gases come into contact with the driest coal.

The choice of a coal dryer is greatly influenced by the physical coal condition. Coarse granular coal has rapid heat transfer, thus allowing high inlet gas temperature with short contact time, for example 1 to 10 seconds for flash driers. Cascade driers dry coal from 6 to 3% with a contact time below 2 seconds for coal sizes of 1½"-0. Very fine coal does not allow high gas inlet temperatures, and gas speed has to be made-rate, i.e., large volumes at low temperature are required, preferably with very uniform rate of feeding.

A special problem is drying of peat because of its very high moisture content (undrained peat can have between 90½ and 95% water), and the powerful chemical affinity of this moisture to the solid particles.

Drier Design and Performance.

The mainly used drier types use direct heat, i.e., a mixture of hot gases from combustion with air is brought into direct contact with the coal. Indirect heated coal driers are made, but they are less common in practical use. A rough and ready classification may be as follows:

(a) Revolving-drum types of the single shell, double shell, or outside heated type, as shown in Fig. 1 and Fig. 2 Depending upon inlet temperature, the hot gases are forced through the central section of the shell or are first passed through a jacket on the outside of the shell. Alternatively, the gases may stay outside the shell. Concurrent or countercurrent can be applied, and sometimes a degree of interzonal circulation is possible. In the rotating shell type internal paddles or shelves produce load uniformity, and by producing a cascade effect with spiral action a longtidutinal movement can be produced.

(b) Revolving and Stationary Tray Driers. They consist of stationary cylindrical vertical casings, in which the coal falls by gravity from one to another of a series of horizontal trays or tables.

(c) Cascade Type Driers. Examples are the Baughman Vertivane and the Link Belt Multi-louvre drier, which wil be described later.

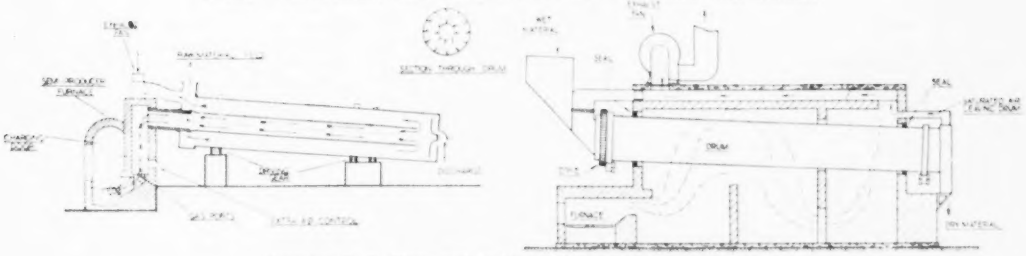
(d) Screen driers have come fairly extensively into use in U.S.A. and Canada. The coal travels on a shaking screen and the hot gases are forced vertically downward. An example is the McNally-Vissac drier.

(e) Flash, Pneumatic or Aspirator types apply heat during suspension of coal particles in a stream of hot air or gas (see Fig. 3).

(f) Special Drier types, such as in development by the U.S.A. Bureau of Mines. To this drier group also belongs the Peco thermal drying system for peat, used to evaporate moisture from milled peat at 55½ down to 12%. Drying of peat of below ¼" mesh is per-

Fig. 2 and 2A.

Double — Shell Rotary Drier (left) and Outside Heated Shell Drier (right).



Courtesy R. R. Clegg and Institute of Fuel, London, England.

formed in counter-current heat flow tubular driers in two stages.

A rough grouping of Indirect Heat Driers, mainly used in the brown coal industry on the European Continent can be:

(1) Steam-heat applied in closed pressure vessels (Fleissner process). (2) Tubular driers used for brown coal preliminary to briquetting. (3) The Lopulco type for bituminous coals, having a central rotating frame work in a stationary cylindrical casing. Circular cast iron tables, each have a set of steam coils cast inside it, are mounted on the central frame.

Modern Direct-Heat Driers.

Revolving Drum Driers. The Ruggles-Coles drier, consists of a cylindrical drum with a central cylindrical flue secured to the outer casing. The hot gases pass from the furnace through the central flue and then through the annular space between the two casings back to the inlet end, where they are removed by an exhausting fan. The coal enters through a chute at the furnace end into the space between the two cylinders and travels forward against the returning gases as a result of the downward inclination of the drum. In its travel it is lifted by a series of longitudinal flights secured to the inside of the outer cylinder and dropped repeatedly on the surface of the heated inner cylinder. It therefore acquires heat both by convection and by conduction, but is essentially a counter-flow drier. Radiation losses are rather high and the lower consumption is also high, a drum 7 ft. 6 in. diameter and 55 ft. long requiring about 25 h.p. Direct contact between the coal and the heated inner flue tends rather to overheat the coal, and this limits the size range than can be dried simultaneously. With too wide a range of sizes the coarser grains tend to overheat, whilst the fines are inadequately dried; this objection applies to all driers in which heating is done by conduction.

The Buttner drier, is a parallel-flow type, the coal and hot gases both entering the drum at the upper end and being discharged at the lower end. The coal is lifted by flights on the inside of the drum and falls over a series of cross-sectioned plates running longitudinally from end to end of the drum. The coal falling from plate to plate turns over four times in each revolution and is thus brought into intimate contact with the drying gases. Operating details are generally similar to those for the Ruggles-Coles drier, but the exhaust gases may be rather higher in temperature.

In both the Ruggles-Coles and the Buttner driers considerable breakage of the coal is inevitable, and both are bulky.

The Pehrson (or Roto-Louvre) drier, shown in Fig. 4, is a more compact type of rotary drier. The hot gases are supplied by a fan to a series of tapered longitudinal channels lining the inner surface of the drum, each being covered by a louvre-plate. The hot gases pass through the openings into the bed of coal, which occupies about one-third of the cross-section. The coal travels upward in contact with the louvre-plates in the direction of rotation and tumbles or rolls over itself on reaching the top of the bed whilst the gases are diffused through it. The bed is shallower near the feed end because of the tape of the gas channels from the feed to the discharge end, so that the bulk of the gases are supplied to the coal where it is wettest, and a small quantity of gases, still at the highest temperature, completes the drying at the discharge end. This type or drier thus has the advantages both of counter-flow and of parallel-flow. The coal passes quickly through the drier, a length of 15 ft. being sufficient as against 55 ft. for the Ruggles-Coles, and breakage is a minimum. The short drum can be lagged and high thermal fans, one for the inlet and one for the exhaust gases, but the gases emerge from an extended area of coal surface, with a low velocity, and therefore carry a minimum quantity of dust.

There are other types of rotary drum driers besides those mentioned, but without great differences in design. Rotary drum driers are simple in construction and operation, but are all more suitable for coarse coals (above $\frac{1}{8}$ in., for example) than for fine coals.

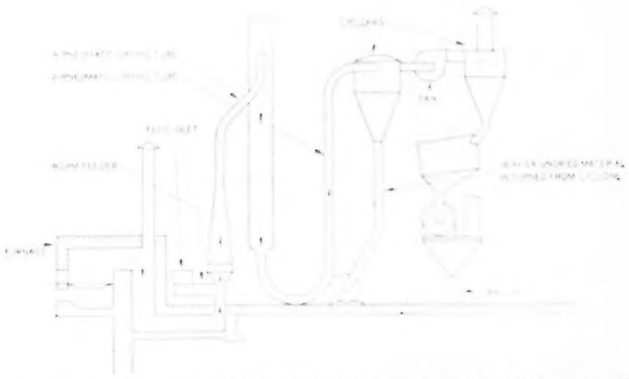
Revolving and Stationary Tray Driers.

In Driers of this type the trays may revolve, the coal being scraped from tray to tray by a stationary arm, or may be stationary, passage from one tray to the next lower one being effected by revolving arms which distribute the coal over the tray and discharge it over the outer edge to the tray below. The hot gases usually enter at the lower end and pass upwards through perforations in the trays, thus passing through each layer of coal; or, where the trays are not perforated, they may be deflected from one tray compartment to the next one above it by a series of plates, thus passing over the surface of the coal. In the latter type, the hot gases make direct contact with the coal in its fall from tray to tray, and in this respect they resemble cascade driers.

Tray-type driers may have high thermal efficiencies, but can cause considerable degradation of the coal; the gas velocity is frequently high, and there is a tendency to

Fig. 3.

Pneumatic Drier Plant.



Courtesy Journal of Institute of Fuel (From Symposium "A Study in Drying").

entrain considerable quantities of dust. This type of drier is economical in floor space but requires considerable height, so that the coal must usually be elevated before or after drying.

The Reol Drier comprises a series of circular horizontal shelves made of cast iron, with steel scrapers mounted on a central shaft which revolve at about 5 r.p.m. and scrape the coal from one shelf to the next lower one. In passing through the drier the coal may be subjected to 40 separate drops, during each of which it passes through an ascending current of hot gasses. This type might therefore well be classed as a cascade drier. The drier is used in South Wales for a mixture of washed duff and froth-flotation fines for briquetting, and the constant mixing and mild agitation appear to render it suitable for such a coal, though there might be considerable balling if uncleaned fines were treated. A drier about 7 ft. 6 in. diameter with an effective drying height of about 24 ft can handle about 35 tons hr. of a washed duff fines mixture, evaporating about 3½ tons of water per hour.

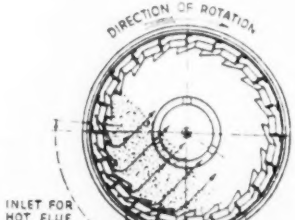
Cascade Driers.

The usual type of cascade drier is rectangular in section and fitted with a series of horizontal star-shaped rollers which revolve, the cup of the star catching the coal as it falls from the roller next above it. With this type of drier the coal passes more quickly through and is perhaps subject to rather less breakage than in the tray type of drier, but drying is irregular and very uniform feed conditions are required. Driers of this type are therefore little used for coal drying, but two new designs of cascade drier have recently been introduced.

In the Baughman Verti-Vane drier, the coal falls from a feed hopper through a scraping feeder between two sets of vanes inside a stationary vertical chamber, 12 ft. diameter. The outer set of vanes is stationary and secured to the casing. The inner set of vanes is mounted on a framework which revolves at about 1 r.p.m. The coal falls under the agitation produced by the revolving inner vanes and the dry coal is collected in the hopper-shaped bottom of the vessel and fed to a worm conveyor for discharge. The hot gases from the furnace, under the action of an exhausting fan, enters through a port in the casing and surround the outer vanes, being then pulled through the coal to a central duct.

Fig. 4.

Pehrson (Roto-Louvre) Drier.



Courtesy "A Study in Drying."

The rate of flow of coal is controlled by the speed of revolution of the inner vanes and by adjustable ploughs in the discharge hopper. Seals are made automatically by the coal in the feed bin and in the discharge hopper.

The Link-Belt Multi-Louvre Drier is shown in Fig. 5. It contains of a chamber inclined at about 30° to the vertical in which is housed a continuous flight conveyor driven by roller chains. The coal is fed to a worm conveyor at one side of the drying chamber and near to its lower end, into the lifting flights which carry it upward to the top of their path, the flights thus acting as lifting trays. At the top, as the chains pass over the sprockets, the flights tilt and spill the coal which cascades downwards and may either be caught by other rising flights or fall to the base of the chamber into a paddle conveyor (continues with the feed worm), which moves it forward and also throws it back into the lifting flights. As the coal is fed at the side of the drier the flights are first loaded at the end; coal cascading on to a fully loaded flight thus falls laterally away from the feed end. By continuously rising and falling the coal gradually makes its way from the side of the chamber at which it was introduced to the other (or district) side, where it is collected by the worm conveyor and discharged.

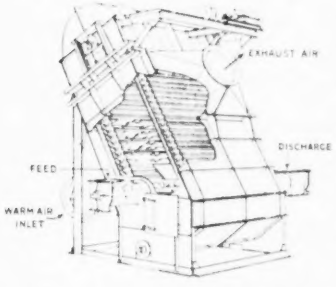
Air is supplied by a blowing fan to a furnace, and the hot combustion gases are introduced directly from the furnace at temperatures up to 850°F. to an inlet port which stretches across the underside of the casing. The hot gases pass through the flight conveyor and through the cascading coal and travel very quickly to the exhaust port on the upper side of the casing, whence they are removed by an exhausting fan.

The Modave drier, shown in Fig. 6 has been installed for drying clean fine coal from the froth flotation plant at the Hechteron and Zolder mine, Belgium. The machine consists of a vertical chamber about 40 ft. high, containing a series of horizontal screw conveyors disposed one over the other, each being separately encased inside the main body. The coal enters the upper conveyor, from the end of which it is fed to the next lower one, and it progresses gradually through each conveyor to be discharged at the bottom.

There are two gas inlets, both at the bottom of the machine. Gases of moderate temperature (300° F.) are admitted at one inlet and pass through channels around and on the outside of each screw conveyor, sweeping each horizontally and then passing by a vertical duct to the conveyor above. They move in counter-flow to the coal, but not in contact with it. At the

Fig. 5.

The Link-Belt Multi-Louvre Coal Drier.



second gas inlet, high-temperature gases (up to 1,400° F.) are admitted and pass into a vertical flue running to the top of the machine. A portion of these high temperature gases is added to the "moderate-temperature" gases at succeeding levels to give a gradually increasing temperature outside the screw conveyor casings from bottom to top. Any excess of the high temperature gases is admixed with the moderate-temperature gases which have completed their upward sweep, and the mixture of gases is then admitted to the inside of the screw conveyor; it then passes in a parallel direction and in contact with the coal from screw to screw until finally discharged at the base of the machine into a cyclone at the base of a chimney. Provision is also made for a portion of the high-temperature gases, in their upward ascent through the vertical flue, to be admitted in regulated quantities into the inside of the screw-conveyor casings. The descending gases are thus reheated to maintain suitable temperatures inside the casings and in contact with the coal.

The entire gas circuit is controlled by one exhaust fan, and the two circuits of gas are obtained from a single pulverized-fuel furnace by controlled dilution of the combustion gases with cold air. The exhaust gases are withdrawn at a temperature of 200° to 300° F. and the fine coal, which is dried from 25-30 per cent of moisture to 7-10 per cent, emerges at a temperature of 140° F. The plant at Hechteren and Zolder has a capacity of about 25 tons hr., involving an evaporation of about 5 tons of water.

Screen driers.

Screen driers are fairly extensively used in America and Canada, where there is a need to remove cheaply sufficient surface moisture to prevent the coal from freezing in winter, and, with long hauls, to reduce the cost of transport of inert material.

In driers of this type hot gases are forced downward (occasionally upward) through the coal as it travels forward along a shaking screen. The motion of the screen provides sufficient agitation to give a reasonable uniformity of drying, but only partial drying can be achieved and such driers can clearly be employed only for coarse coal, preferably larger than about 3/16 inch.

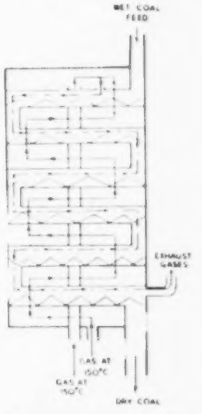
On any screen excess water drains naturally from the coal and, as the capillary forces retaining the moisture decrease with an increase of temperature the gradual heating of the coal results in more effective de-watering by natural drainage, thus reducing the quantity of water to be evaporated.

The McNally-Vissac drier, shown diagrammatically in Fig. 7, consists of two inclined balanced tanden screen decks actuated in opposition from an eccentric shaft. As the coal travels forward along the screen hot gases are drawn through it by an exhausting fan. By means of a pulsator the gases are drawn alternately through one deck and then through the other, reversals occurring about 30 times per minute. It is claimed that the bulk of the moisture is removed mechanically. When the pulsator is open to one deck the gases pass freely through the bed, evaporating moisture and supplying sensible heat to the coal. As the suction develops the coal becomes clamped to the deck and water is squeezed by pressure out of the voids. The reversal of the pulsator releases the suction and permits the coal to loosen and move forward. Motion is synchronized by driving the pulsator from the eccentric shaft. Moisture which drains from the coal, or is condensed from the used gases, is collected in an effluent sump and may be returned to the washery circuit.

To meet fluctuation conditions of load and variations in moisture content of the coal thermostatic controls are provided. If the temperature of the exhaust gases falls, owing to an increase in the rate of the feed or if its moisture content, a damper in the hot-gas inlet duct is opened and increases the flow of hot gases. To prevent excessive increase in the temperature of the gases reaching the coal bed owing to the increased supply of heat, a cool-air inlet is opened, being actuated from a thermocouple above the bed. If the temperature of the exhaust gases rises the rate of flow of hot inlet gases is reduced. An inlet for cooling air is shown in Fig. 7 below the hot-gas inlet duct. The air is induced by the fan and passes through the coal immediately before its discharge. It uses the sensible heat of the coal to effect a further degree of drying.

Fig. 6.

Modave Drier.



The design of the machine obviously precludes the use of high inlet temperatures, but an apparently high thermal efficiency is maintained because the exhaust gases are virtually saturated. Owing to the complications between evaporated moisture and de-watering by drainage and to the cooling of the exhaust gases by contact with drainage water, it is not at all easy to assess how much of the moisture has in fact been removed by thermal action. The figures in Table 2 indicate, however, that in practice the heat consumption per ton of water removed is comparatively low.

Flash, Pneumatic or Aspirator-type Driers.

In flash-type driers the coal is dried whilst suspended in a stream of hot air or gas. Such driers have an application for drying slurry or filter cake prior to pulverization. They are used also in Germany (Büttner and Rema-Rosin type) for drying crushed lignite before briquetting, for the rapid heat transfer and the rapid evolution of vapour disintegrate the particles and promote uniformity in the product.

Driers of Other Types.

Although there has as yet been no commercial application, considerable preliminary experimental work has been done by the U. S. Bureau of Mines in the development of a drier for fine coal, to overcome the disadvantages of the flash-type drier. The principle employed is to suspend the solid particles in a rising stream of hot gases, the velocity of which is sufficient to keep the mass in a fluid condition but insufficient to cause entrainment of the individual particles. To obtain this fluid condition the velocity of the rising gases must be within well-defined limits, depending upon the size distribution of the coal and the density of its particles and of the gases. Several pilot plants have been erected consisting of vertical chambers 6 to 12 in. diameter and about 6 to 12 diameters high, in which lignites and low-rank coals with 62 to 24 per cent of moisture have been dried to moisture contents usually around 5 per cent. These plants use inlet gas temperatures of over 1,500 F. on entry into the drier column, the temperature falling usually to between 300° and 450 F. where the gases and coal first become mixed; exhaust temperatures (at the top of the column) are between 260° and 300 F. Above the drying column the tube narrows, so that the particles are entrained and carried forward to be collected in cyclones, with a final dust extraction by precipitators or water sprays.

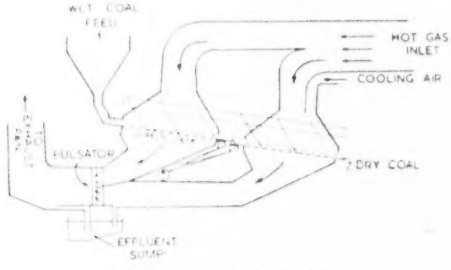
The time of contact varies between 20 and 230 sec., depending upon conditions, and the raw coal is usually ¼ in.-0, though sizes up to ½ in. have been employed. The system seems very suitable for the drying of low-rank coals; the high rate of heat transfer gives rapid vaporization of inherent moisture, which splits the particles and further assists rapid drying.

An installation has also been made for the drying of washed slack by the use of radiant heat generated electrically. Infra-red radiation only undergoes transformation into heat when absorbed by the particles, and so there are no heat losses to the air. Where electricity is cheap, radiat-heat driers may have interesting possibilities. They might also be practicable if the radiant surface could be obtained from cheap coke-oven gas, the waste gases being also used to supply sensible heat and to sweep away the evaporated moisture. The cost of fuel might be recomposed by the saving in other costs, especially in regard to dust collection, and in added convenience.

A slurry drier is now under experimental trial in France which offers some prospect of success in removing the bulk of the water from sticky materials such as fine unwashed coal. The de-watered slurry is fed by a feeder between two grooved rolls rotating in opposite directions, the pressure bringing the moisture to the surface. The thin band of slurry passes from the rolls to the surface of a larger cylindrical roll where it is again compressed by a number of small rollers in rough contact with the surface. The whole is enclosed in an airtight brick chamber through which hot gases are made to pass, so that the moisture squeezed to the surface can be evaporated.

Fig. 7.

McNally — Vissac Screen Drier.



From "A Study in Drying."

* * *

ACKNOWLEDGEMENT

The above article is a precis, taken from the paper by W. R. Chapman and L. W. Needham, published by permission of the National Coal Board, Cheltenham and London (England), entitled "THE THERMAL DRYING OF COAL," contributed to a Symposium "A STUDY IN DRYING," published in The Journal of The Institute of Fuel, London, 1951. The contents of the paper do not necessarily represent the views of the Coal Board, neither is the Institute of Fuel as a body responsible for statements made or opinions expressed by the two authors of the paper.

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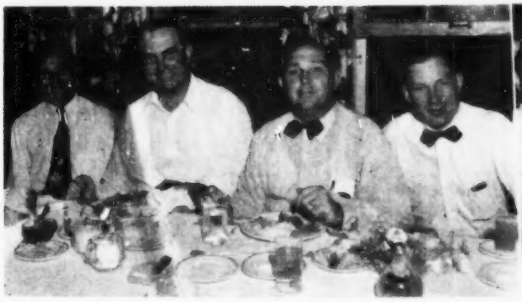
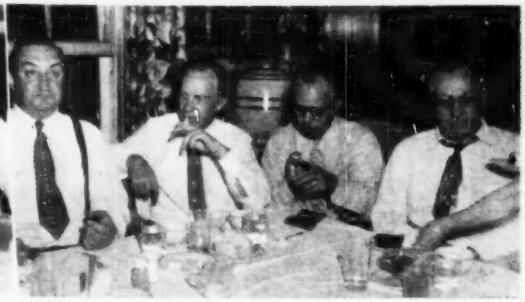


S. G. Kinick, President of the Greene County Country Club; Dick Johnson, Mine Safety Appliances Co.; Allan Brooks, Gen. Mgr. Mather Collieries; Chas. Meyers, Mine Safety Appliances Co.



Left: Karl Connerth, Gen. Supt. Mines; H. C. Frick, Coke Co.; H. C. Niquist, V-Pres., charge of coal sales, Joy Mfg. Co.; Bill Schiffbauer, Buckeye Coal Co.; J. W. Milam, Sales Eng., Joy Mfg Co.

Golf Parties of the Western Pennsylvania Coal Operators

Importance of the Electronic Brain in Mining Coal

Completely automatic factories run by giant mechanical "brains" assisted by smaller ones are now foreseen.

Such machines could work out the design of a machine part, punch out the proper information on a paper tape, then feed the tape to a production machine that would accurately cut the part to the correct shape or to mine coal as required by the seam conditions encountered.

Left: E. S. Claycomb, Sproul Lumber Co.; Kenneth Bartlett, Div. Supt., Bethlehem Coolieries; Jim Elkin, Gen. Supt. Mines, Duquesne Light Co.; Horrold manufacturers representative; Willis Griffin, manufacturers representative.

Dr. J. W. McRae, vice-president of Bell Telephone Laboratories, recently told a symposium on communications and the future that there is today "a real basis" for predicting such machines. They open up the "prospect of relief from human mental drudgery just as the application of power in the industrial revolution gave relief from physical drudgery."

Jobs that we cannot now imagine could be done by such machines. There is no need to worry about the possibility that they will take over to rule mankind or that the human mental process will become less efficient.

"None of these electronic brains is a true brain in the sense that none of them can ever have creative thoughts. They can only," Dr. McRae stated, "do what man has designed them to do and what he has instructed them to do in detail. Man can remain in full control, and he can benefit from a general increase in the intellectual content of his work."

(Continued on Page 22)

Left: H. L. Swihart, Gen. Supt., Buckeye Coal Co.; W. E. Overturf, Joy Mfg. Co.; Sam A. Midkiff, Chicago, Pneumatic Tool Co.; J. V. McKenna, Penna., Dept. of Mines.

Left: Matt Blair, Retired; Howard Miller, Electric Engineer, Crucible Fuel Co.; Martin Valeery, Asst. Supe., Buckeye Coal Co.; R. C. Vance, Div. Mgr., Joy Mfg. Co.

COMPTON AUGER

Improves product and cuts cost of
STRIP MINE OPERATIONS

The Compton Auger introduces an entirely new and unique method of recovering high wall coal at phenomenally low costs.

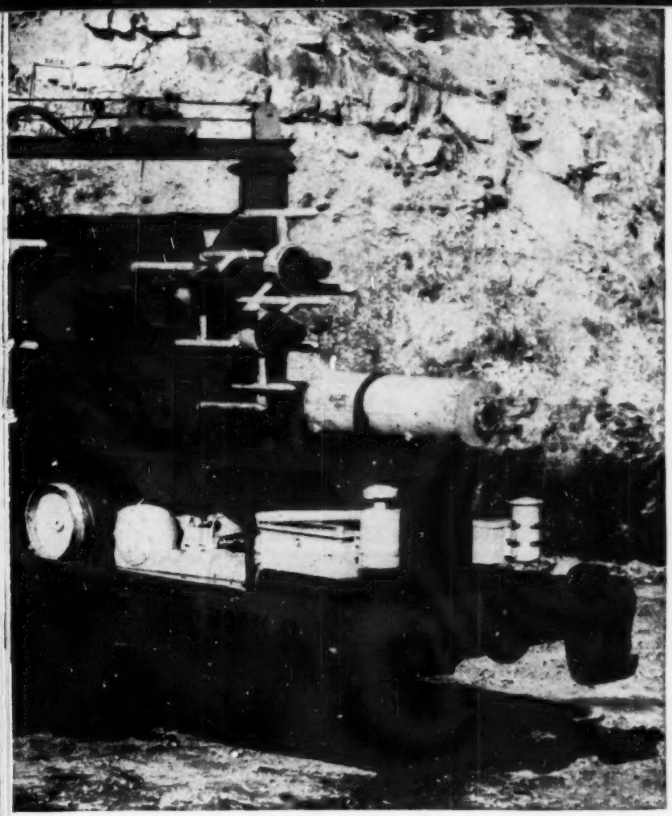
Used in conjunction with your present strip mining equipment you can blend auger mined coal with your regular production and improve the overall quality substantially.

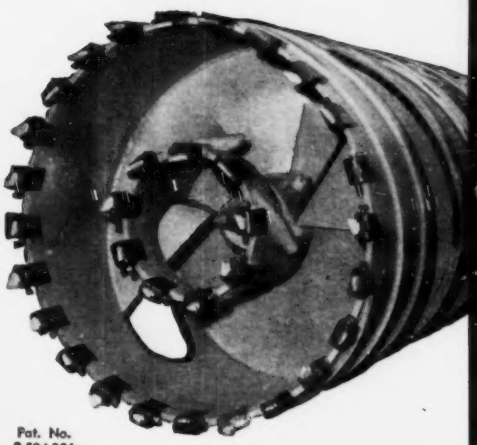
In mines where these machines have been in operation for the past two or three years, the Auger has paid for itself many times. In fact, under normal production conditions it should pay off the investment in six months or less.

From the productive standpoint, the Model 42 shown here has been drilling 42 inch holes to a 189 foot depth and producing up to 500 tons per shift in the Pittsburgh seam. Another example—Nine Compton augers in use by five companies in three states have a total potential capacity of 1,800,000 tons per year based on 200 days of two shift work.

The Model 42 is 42 feet in length—weighs approximately 33 tons—carries nine 21 foot auger sections—requires only a 45 foot minimum pit width—is powered with 225 H.P. Diesel engine—has hydraulic jacks in each of the four vertical frame members which have a lift of 66 inches and permit drilling of overlapping holes—can be equipped with augers from 48 inch to 30 inch diameter.

The Compton Model 56 Auger is 56 feet in length—weighs approximately 50 tons—carries six 34 foot auger sections—requires a minimum pit width of 60 feet—also has a hydraulic lift of 66 inches and permits drilling of single or overlapping holes—is powered by a 300 H.P. Diesel engine—can be furnished with augers from 52 inch to 30 inch diameter—and provides a total drilling depth of 204 feet.





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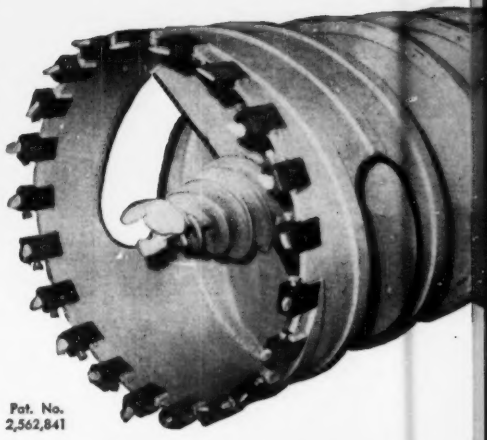

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MINING...

COMPTON *Non-Clogging* AUGER HEADS

(PATENTED)

The unique cutting heads shown here were designed—developed and built by a coal operating company and their construction adheres closely to long accepted and proved practices of cutting coal. These new cutter heads have two types of core breakers which are interchangeable to meet the requirements of the various seam structures and to produce more and larger lump coal.

The new type heads, capable of cutting coal at high speeds without clogging, assure a continuous flow of coal from head to truck during entire hole cutting operation. Maintaining a constant peripheral speed for all diameters makes it possible to get large tonnages even with the smaller diameter augers.

COMPTON, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEAD

Box 1946—Phone 4-6384 **CLARKSBURG, W. VA.**

C. Cash, repairman, Crucible Fuel Co.; Chas. Haden, A. H. Trotter Coal Co.; Roy Howorth, Bakes Supply Co.; Jim Trotter, President, Trotter Coal Co.

Left to right: Leo J. Schulte, Manufacturers representative, A. Shore, buyer for U. S. Steel Co.; M. D. Cooper, Natl. Coal Assn.; Eddie Phillips, Sales Mgr., Tom Brown Industrial Supply Co.

GOLF PARTIES

(Continued from Page 19)

Of great promise in the development of electronic computers are transistors, pea sized, rugged devices that do many of the jobs of vacuum tubes more efficiently and on considerably less power. In one test made, Dr. McRae reported, a 10-to-one reduction in power consumption and in volume of equipment was possible using transistors instead of vacuum tubes.

Such electronic brains will not come into being overnight, because so much scientific and engineering work will be needed to develop and construct them.

In order to better understand and better utilize the electronic brain when it is perfected, the coal mining industry should be vitally interested in learning now as much as it can about how and why the electronic brain operates. It is my personal belief that the coal industry is shamefully ignorant of the possibility and the importance of the electronic brain in automatic coal mining.

I have said it before and I say it again! "Gatherings such as these golf parties, which this year have attracted more of the higher officials than ever before, offer the best kind of opportunity to become informed about how automatic gadgets can be applied to mining coal."

Left: H. E. Stakely and R. B. Crawford of the R. T. Woodings, Inc.; C. E. McGlaughlin, Bituminous Coal Research, Inc. and Robert T. Woodings.

Left: Herb Dunbar, Supperior Supply Co.; Frank Dunbar, Retired; Thomas Mrk, Mine Foreman, Crucible Fuel Co.; Walter Koch, U. S. Rubber Co.

Left: The Honorable Richard Maize, Chief Dept. of Mines, Penna.; J. H. Wallins; W. G. Thomas, Deputy Inspector of Mines, Penna.; Alex Bailey of the Bailey Coal Co., President of the Association.

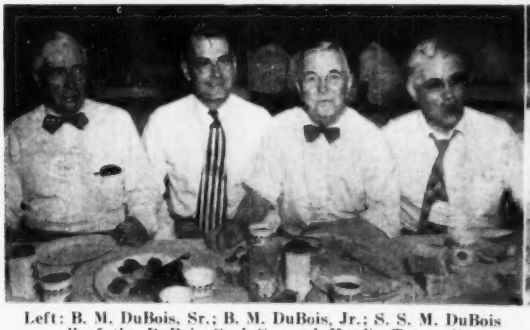
Left: R. M. Hess, V. P. in charge of operations, Morrisdale Coal Co.; B. F. Nichodemis, McFeely Brick Co.; H. D. Woolridge, President, Woolridge Coal Co.; Richard T. Todhunter, Sr., Barnes & Tucker Company.

Central Pennsylvania Open Pit Mining Association Annual Field Day

The Central Pennsylvania Open Pit Mining Association held its Annual Field Day at the American Legion Artic Springs Park near Philipsburg, Pennsylvania, on Wednesday, August 29. A buffet lunch was served by the Moore's Industrial Supply Company. Refreshments, all afternoon were by the Beckwith Machinery Company and the Highway Equipment Company. Golf was played at the Philipsburg Country Club. The Association Dinner was at 7 P. M.

This year the gathering was better supervised and more orderly and on a much higher level but, like too many other gatherings of this kind with the TOP BRASS in attendance, no time was taken out to advance the industry. There is so much to know in this industry and so little time to learn that no gathering such as this should miss the opportunity to enrich our

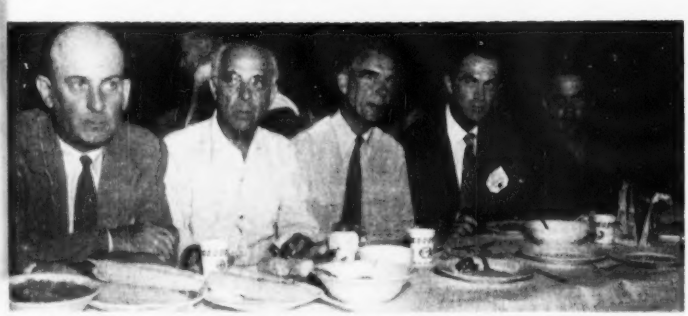
Left: Chet Amick, Supt., and Harold D. Fleck, Mgr. of the John E. Teeter Coal Co.; R. D. Jones and D. Crispell of the Putman & Greene Co.; L. W. Kuntz of the Elba Coal Co. Right: J. S. Buchanan, Gulf Oil Corp. and Norman Burge and Joseph Helsel of the Robert Bailey Co.



Left: B. M. DuBois, Sr.; B. M. DuBois, Jr.; S. S. M. DuBois all of the DuBois Coal Co. and Hardie Tatersall.

Left: Roy Cleveland, Cleveland Bros.; Fred Sherman; John E. Teeter, Teeter Coal Co.; and Rex Eaton, Cleveland Bros.

Group of the Elliot Coal Company. Left, front row: Ray Werner, engineer; John Frank, Machinist; John Ellis, preparation engineer; Dick Thomas, superintendent; Back row, left: W. M. Brable, reclamation engineer; Levi Stein, president; M. J. Solinsky, foreman;; Thad Wayne, business manager; Merrill Stein, charge of operations. Third row: Vincent Luther, coal properties manager; Jonah Knowles, coal testing laboratory.



Left: E. P. Spencer, Catarach Coal Co.; A. B. Adelman, Middle Penna. Coal Co.; Ralph Kuhns, H & K Coal Co.; Geo. Hamilton Golf Pro. and O. T. Shingledecker, Putman & Greene.

minds. A few minutes at dinner would enlighten the coal stripper about the importance of grass to man.

Grass is as vital to us as sunshine and is more valuable than gold. Grasses are quick spreading, are productive, are adaptable, are tough, are well equipped to fight for survival and are found in deserts, in polar regions, on mountain tops and under water. Imprints on rock indicate that grasses existed 20 million years ago and at one

B. F. Deringer and F. W. Krater

time dominated this earth. Scientists predict grasses will be on this earth long after man has departed.

There are more than 6,000 kinds of grasses and more individual plants than any other kind of plant. By drawing large quantities of nourishment from the soil and working it over, grasses provide

Left to right: Joseph Rusnick, Hawk Run Coal Co.; Geo. W. Trumble, Woolridge Coal Co.; Mears, Robert Bailey Coal Co.; Cortez Bell, Judge Clearfield County; D. Andy Gearhart, Moore Industrial Supply Co.

Left: Larry Cummins, Atlas Equipment Co.; Jack Gray, Mine Inspector; Jack O'Niel, Robert Bailey Coal Co.; John C. Rice, Putman & Greene.

nutrients for livestock and for man. Man realized early in history that grasses offered him a way to get food of a high quality by cutivating grasses and eating their seed. Oats corn, wheat, rye and barley came from cultivated grasses. Bamboo. Rice and cane from which we get sugar are cultivated grasses. Cultivated grasses provide basic food for man all over this earth. The Indo-Chinese culture was based on rice, the Mediterranian culture on wheat and the original American culture on corn.

Roots of grass are fine and extend long distances. Roots of grass hold soil in place with a powerful grip. They gather and hold water —that is why spring water in grasslands is clearer and better for drinking purposes. Grasslands hold 1,000 times more soil in place and 300 times more water than crop cultivated soil holds.

Grass is the most effective and the cheapest means of holding rain water where is falls. Grass controls floods and protects the soil from being washed or blown away. Controlling floods, grass is 10,000 times more effective than all the dams built by man.

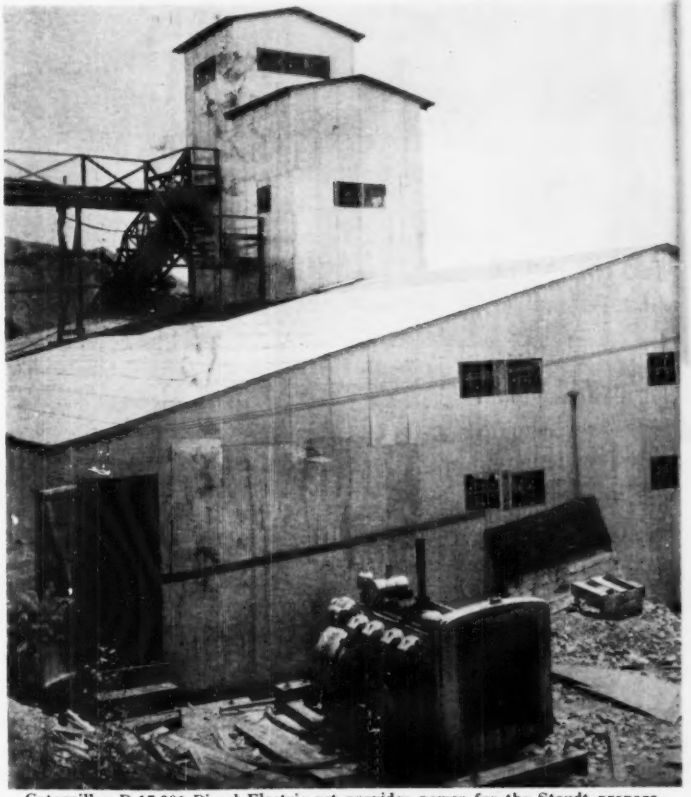
● Just how "human" are these new electronic computing machines that seem to do everything but put out the cat?

Not as human as people are led to believe, protests Reginald O. Kapp, of Crovdon, England, in a simmering letter to the British science journal, Nature.

It is all a matter of language, Mr. Kapp argued. Records on the machines are called "memories," he said, and simple codes are termed "machine language." What is done to the machines by the operator is now called "teaching." "In engineering, words 'setting' or 'adjustment' have the same meaning. Why not use them?" he asked.

Perhaps worst of all, wrote Mr. Kapp, a predetermined sequence of events in an electronic computer has been called a "decision" of the machine. Careful scientists do not admit that lower animals make decisions—much less a pile of machinery, he concluded icily.

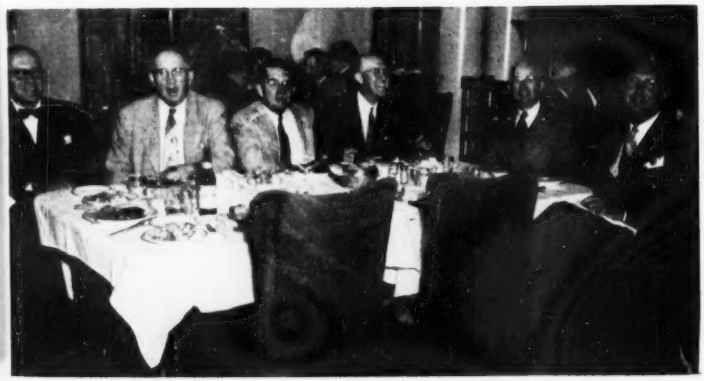
Caterpillar D-8 tractor pulling No. 80 Caterpillar scraper full of river dredged coal to the Stoudt preparation plant at Leesport, Pa.



Caterpillar D-17,000 Diesel Electric set provides power for the Stoudt preparation plant at Leesport, Pa.

Left: T. Reed Scollon, Chief, Bituminous Coal Section, Office of Price Stabilization, Washington, D. C.; W. Garfield Thomas, Deputy Secretary of Mines, Harrisburg, Pa.; J. William Vetter, Vice-President, Central Pennsylvania Coal Producers Assn.; Tom Pickett, Executive Vice-President, National Coal Assn., Washington, D. C.; F. A. Fontyn, Vice-President, Eastern Bituminous Coal Assn. John D. Battle, Asst. to President, National Coal Assn., Washington, D. C.; Walter Jones, retired after 30 years of service with this Association; Ralph Moore, President of the Association, and President of the C. A. Hughes Co.; A. W. Gauger, State College; Frank G. Smith, Counsel for the Assn.

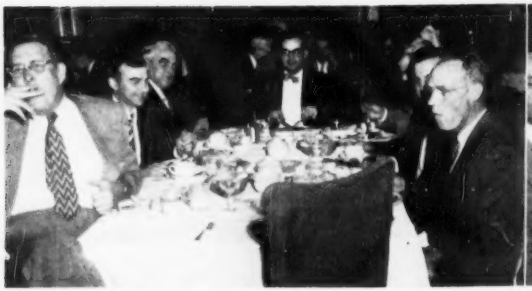
Annual Meeting of the Central Pennsylvania Coal Producers Association



Left: J. B. Mull, Chairman of the Board and Richard T. Todhunter of the Barnes & Tucker Co.; E. P. Jaggaed, Salesmanager, C. A. Hughes & Co.; F. P. Roberts, H. H. Hamilton, Pur. Agt., Barnes & Tucker Co.; Pete Sutphen, Owner, Sutphen Wood Pipe Co.

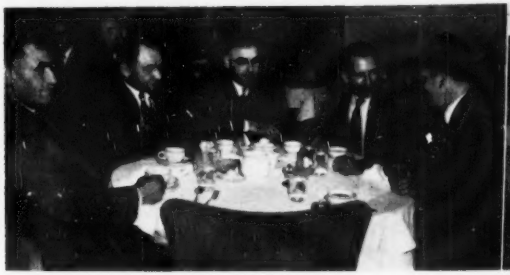
The annual meeting of the Central Pennsylvania and the Eastern Bituminous Coal Operators Associations was held at the Bedford Springs Hotel October 2 and 3. John

Thomas Pickett of the National Coal Association was the principle speaker at the banquet.



H. C. Birkhead, Vice-Pres. Sales, R. Hisby, Asst. to President, both from the Penna. Coal & Coke Corp.; W. R. Kelly, Chief Eng., and Dennis Keenan, Gen. Mgr., Sterling Coal Co.; F. J. Freese, Dist. Att. Cambria County; H. B. Wickey, V-Pres., R. H. Callahan Special Asst. to V-Pres., Pa. Coal & Coke Corp.

Fred A. Weiss, Coal Buyer, Baltimore; John S. Magee, Lewis Williams, Jr., Vice Pres., Williams Moshannon Mining Corp.; T. R. Fitzpatrick, Gen. Freight Agent, N. Y. C. R. R., Pittsburgh; Lewis Williams, Sr., Pres. Williams Moshannon Mining Corp.



Left: Patsy Palumbo, Underhill Coal Mining Co.; Donald Camioni, and A. J. Palumbo, Pres. of the New Shawmut Mining Co.; Isadore Wesner, Chief Eng. and John S. Todhunter, Mining Eng., Barnes & Tucker Co.

R. W. Beamer, Rochester & Pittsburgh Coal Co.; Fr. Adrian Veigle, Pres. St. Francis College; B. W. Deringer, Central Penna. Coal Producers Assn.; Fr. Flanagan, Registrar, St. Francis College; Franklin Miller, Mining Eng., Berwind White Coal Co.; R. M. Fleming, Coordinator for Mining men, St. Francis College.

D. Battle, assistant to the President of the National Coal Association spoke at the business session on October 2. Ralph H. Moore, President of the C. A. Hughes & Company was elected President of both Associations. Robert T. Laing was re-elected Executive Director and Secretary of both groups.

A reception preceeded the banquet the evening of the 2nd. Tom Pickett, Executive Vice-President of the National Coal Association was the principle speaker at the banquet which was attended by about 250 members and guests.

October 3 was devoted to the annual golf tournament at the beautiful Bedford Springs Golf Club.

There cannot be too many such gatherings of key men in our industry. Crisis arising from high costs of production, high taxes, keen competition from gas and fuel oil for not only space heating but also in industry and railroading make it necessary to explore all avenues of possible relief.

Our greatest crisis is the crisis in the organization and accessibility of knowledge. Our encyclopedia of knowledge has never been in order; isn't even arranged alphabetically. Answers we need badly could be buried in our present bits of knowledge. It is our problem to locate the two already known bits of knowledge and place them along side of each other to solve the unknown problems.

Robt. T. Laing, Director and Secretary, leading the members in song in honor of Walter A. Jones, retired after 30 years of service to the Assn.

Smoke from the chimneys of individual dwellings and small apartment houses often does more to pollute the neighborhood atmosphere than the smoke from the factory stacks in cities where coal-burning furnaces are widely used.

This is in spite of popular belief to the contrary. Smoke from factory stacks is denser and more concentrated than that from ordinary dwellings, and therefore more visible. But the total discharge may be much less than the output of the many private houses in the region.

This is the opinion of Dr. Walter C. McCrone of the Armour Research Foundation of Illinois Institute of Technology. At a recent meeting of the American Meteorological Society, he discussed the air pollution problem of Chicago. What is true of this city, however, is true of many others.

Dust, fumes and haze all contribute to this city's air pollution, he said. Stacks and chimneys are the prime sources of settled dust,

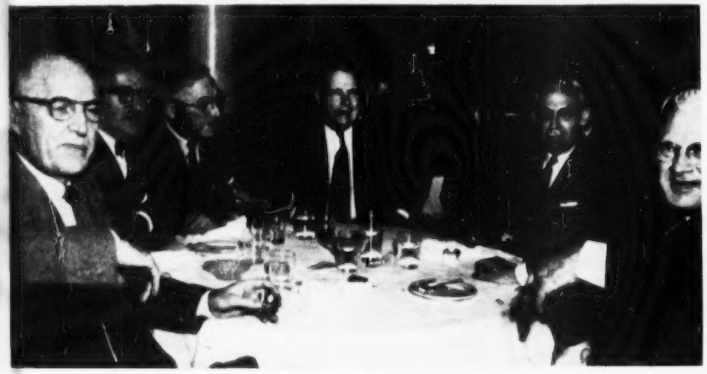
Left: J. K. Nevling, Gen. Council, Bradford Coal Co.; J. C. Logan, Pur. Agt., J. C. Samuels and S. C. Sears of the Lawrence Park Heat, Light and Power Co.; Walter M. Keenan, Eng., Bradford Coal Co.; M. B. Hambright, Engineer, W. F. Jones, Jr., W. T. Davis, Gen. Council, all of the Bradford Coal Co.

Left: J. W. Krous, Gen. Supt., Floyd Gorman, Chief Clerk, Thomas Beibek, Traffic Mgr., Mathew Jarvis, Supt., W. J. Stoker, Supt., and J. M. Cook, Vice-Pres. all of the Imperial Coal Corp.

Left: Walter F. Schulten, Asst. to First V-Pres., Pittsburgh Consolidation Coal Co.; T. J. Crocker, Mgr., Bethlehem Collieries Corp.; standing: Dave Mitchell, Penna. State College; G. A. Shoemaker, Pres., Pittsburgh Coal Co.; L. B. Chalfant, Div. Mgr., Bethlehem Collieries Corp.

P. J. Schweibinz, Gen. Fgt. Agent, N. Y. C. R. R.; Charlie Owen, Chairman of the Board; W. J. Cahill, V-Pres. and J. N. Geyer, all of the Imprial Coal Co.; Dan Moore, V-Pres., C. A. Hughes & Co.; J. H. Murphy, Mgr., Ebensburg Coal Co.; H. B. Bartley, V-Pres., Imperial Coal Co.

he stated. Settled dust contains fly ash from the chimneys, dust and dirt blown from streets and vacant lots, paper, cloth, decay of buildings and mineral constituents of the soil. It may also contain materials blown in from areas outside of the city.



Left: Clark E. Miller, Asst. to Pres., P. & W. Va. Ry.; R. S. Walker, Gen. Mgr., Bradford Coal Co.; F. L. Dobson, P. R. R.; Rod Titus, Freeman Fullerton and Walter Sontum, all of the Pennsylvania Electric Co.

Fumes are gasses, such as hydrogen sulfide, oxides of sulphur, oxides of nitrogen, hydrogen fluoride, carbon monoxide, and complex odoriferous compounds from stockyards, animal-rendering plants, paint manufacturers, and burners of high sulphur coal or oil.

Haze is made up of fine droplets of moisture, which often contain dissolved gases, such as the oxides of sulphur and nitrogen. These droplets are actually sulfuric and nitric acid solutions, and are not only injurious to nylon stockings but also may shorten the life of human beings in daily contact with them.

• Recent purchase of the LaPlant-Choate Manufacturing Company by Allis-Chalmers will add greatly to the number and variety of equipment lines handled by Highway Equipment Company, Pittsburgh, it was announced today by D. L. Reynolds, Highway president.

Highway Equipment Co., for many years Allis-Chalmers distributor in Western Pennsylvania, will immediately take over sales and service of all of the former LaPlant-Choate products, Mr. Reynolds said.

These include a full line of diesel-powered, high speed, rubber tired tractor-scraper combinations. Among the latter are the TS-200 motor scraper with a capacity of 10 cubic yards struck and 13 heaped; the TR-200 rear-dump motor wagon with capacities of 18 or 11 and 15 cubic yards struck and heaped; the TS-300 motor scraper of 14 and 18 cubic yards struck and heaped, and the TW-300 bottom-dump motor wagon of 22 tons capacity or 14 and 19 cubic yards struck and heaped.

Also included are industrial wheel tractors and power units to be handled through Highway's industrial division.

Addition of these new lines now gives Highway one of the most complete equipment stocks in America, according to Mr. Reynolds. "We are now in position to meet virtually every equipment need of earth-moving contractors, mine operators, governmental bodies, home builders and industrial plants," he said.

Other major equipment lines distributed by Highway are: Jaeger, Baker, Gar Wood, Hough, Master, Thor, Wayne Crane; Lima Shovels, Cranes and Draglines, and Erie Bins.

Highway's offices, display rooms and parts and service departments are located at 6465 Hamilton Avenue, Pittsburgh.

• Farmers Engineering and Manufacturing Company has announced the Femco Audiophone, an improved and simplified method of electronically amplified voice communication for industry.

Femco Audiphones are offered as common talking systems, wired to order and consisting of press-to-talk, release-to-listen microphones and speakers at as many stations as are desired. Unless otherwise engineered to suit individual requirements for private two-way conversations, all stations hear simultaneously: directions, orders, warnings, or questions.

Power is drawn from 110 volt, 60 cycle lines with simple plug-in attachments. Output ranges from 10 to 150 watts or more. By use of multiple amplifiers and boosters, extensive networks can be installed and coordinated.

Components include various types of microphones and speakers for different applications, amplifiers, cabinets and accessories. All Femco components are ruggedly built, compact and extremely easy to service when required.

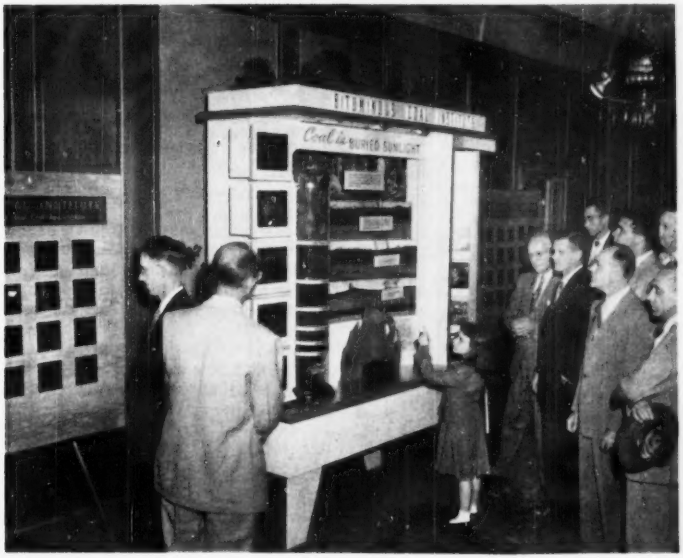
With Femco Audiphone systems, men at the controls can be brought within instantaneous voice contact with each other, even though they work at great distances apart.

Advantages include improved supervision, safety and teamwork with marked savings in production costs and time needed to "get things done."

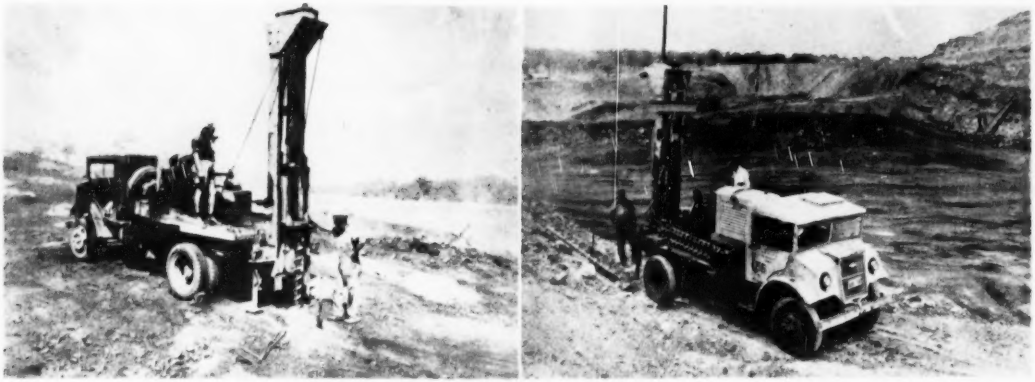
Typical applications include steel mills, manufacturing plants, in mines—between levels and in processing operations, power generating plants and office—plant locations in light industry.

Femco Audiphones are manufactured exclusively by Farmers Engineering and Manufacturing Company, specialists in electronic communication and control. Installations of Femco communication equipment have been made in many of the nation's leading industrial plants. For additional information about Femco Audiphones write manufacturer at Irwin, Pennsylvania, requesting Bulletin No. 26. Copies are free on request.

STORY OF COAL TOLD TO N. & W. EMPLOYEES AT ROANOKE, VA.



Roanoke, Va., Oct. 7 — Some 700 employees of the Norfolk and Western Railway—all members of the Roanoke Better Service Club, one of 21 similar organizations along the N. & W. lines—attended a special meeting held in the ballroom of Hotel Roanoke, Oct. 1, devoted entirely to "Coal: The Magic Mineral." They saw an exhibit, above, arranged by the Bituminous Coal Institute, public relations department of National Coal Association, Washington, D. C.; heard an address, "The Story of Coal," by E. M. Dean, vice president, Virginia Coal Merchants Association; and saw the color film, "Powering America's Progress," presented by T. A. Day, chief of BCI's press information section. The program was arranged by H. L. Scott, 1952-53 chairman of the club. F. S. Baird, N. & W.'s vice president-traffic, introduced the speakers. R. L. Hawkins, this city, district manager of the N. & W. coal bureau, awarded the attendance prizes.



Truck Mounted McCarthy Rock Drilling Machines are used by Thiess Bros. Pty. Ltd., to drill overburden at their Muswellbrook open-cut coal mine. The coal seams may be seen in the exposed face in the background.

"There Is Nothing Better!"

(Reported by Britstand Distributors Ltd., Sydney.)

When drilling the shale and mudstone which comprises the bulk of the overburden at Muswellbrook opencut, "there is nothing better than the McCarthy Rock Drill," says Mr. Stan Thiess, N. S. W. manager for Thiess Brs. Pty. Ltd.

Thiess Bros. Pty. Ltd., one of Australia's largest excavating and earthmoving companies, is engaged in coal mining work at Muswellbrook open-cut mine where their regular daily average is 2,500 tons of coal.

Performance data shows that for every 2,500 tons of coal recovered per day, approximately 10,000 tons of overburden have to be shifted.

The overburden is mainly shale and mudstone with some slate conglomerate and occasional stratas of very hard stone. These had stratas may, at times, require percussion drills, but the bulk of their drilling is done using two McCarthy Rock Drilling machines. The overburden would vary between 15 feet to 50 feet, and holes for the blasting charges are drilled down through the overburden to the top of the coal seam. At the present stage the coal seam would vary in thickness between 12 feet to 20 feet.

The aggregate in the over-burden is classed as moderately hard and the McCarthy Rock Drill averages between 280 and 300 vertical feet per day. The weekly performances being 1500 feet in a five day week. The best daily performance would be approximately 430 feet.

Since this machine was purchased, it has been used full time in open-cut work at Muswellbrook; although the other McCarthy Rock Drill, also seen on the front cover, has been employed on a variety of jobs, including earth tests at Adaminaby on the Snowy River Project. This latter machine is owned by Messrs, Goodsir & Cooper, who are drilling sub-contractors to Thiess Bros. at Muswellbrook.

(Above article from May 1952, issue of Earthmoving, house organ of Britstand, distributors of Salem Tool Co. in Australia.)

• C. B. "Charlie" Foster has been appointed to the newly created position of Sales Manager—Engines,

for Cummins Engine Company, Inc., at Columbus, Indiana, according to an announcement by C. R. Boll, General Sales Manager of the Company.

In his new capacity, Mr. Foster will continue to be in charge of all Government contract work and, in addition, will take over the duties of the former position of Manager—Engine Sales.

Mr. Foster joined the Company in 1950 as National Accounts Representative. He first had his headquarters at Chicago and later moved to Columbus. In 1951 he was appointed Manager—Contract Sales, which position he has held until this promotion.

Mr. Foster brings a wealth of experience in the heavy-duty equipment field to his new position. Immediately prior to joining the Cummins family, he was Assistant to the operating Vice President of the Truax-Traer Coal Company, a position which he accepted after having been Assistant to the Vice President in Charge of Sales of the Bucyrus-Erie Company for a number of years.

Mr. Foster graduated from Purdue University in 1926 with a degree of Bachelor of Science in Chemical Engineering.

● Research engineers at the University of Illinois are girding for a knock-out fight with winter's icy gales.

Round one will get under way sometime in the next few months when cold winds shriek around the university's Warm Air Research Residence.

Research engineers hope to score a knock-out blow with a new heating system. It uses four-inch hot-air ducts instead of the usual six- to 10-inch ones. Easier to install than the larger varieties, the small ducts are to be situated stategically under windows of the house.

If the small ducts prove a real match for frigid winds, future housebuilders may save money by using them.

Sponsored by the National Warm Air Heating and Air Conditioning Association, the bout is one of a series that has been going on here between men and the elements for the last 35 years.

● A new industrial aluminum coating, that can be sprayed without spattering objects of surfaces four feet or more in the background, has recently been placed on the market by Royston Laboratories, Inc., Blawnox, Pa., after a two-year period of test-proving.

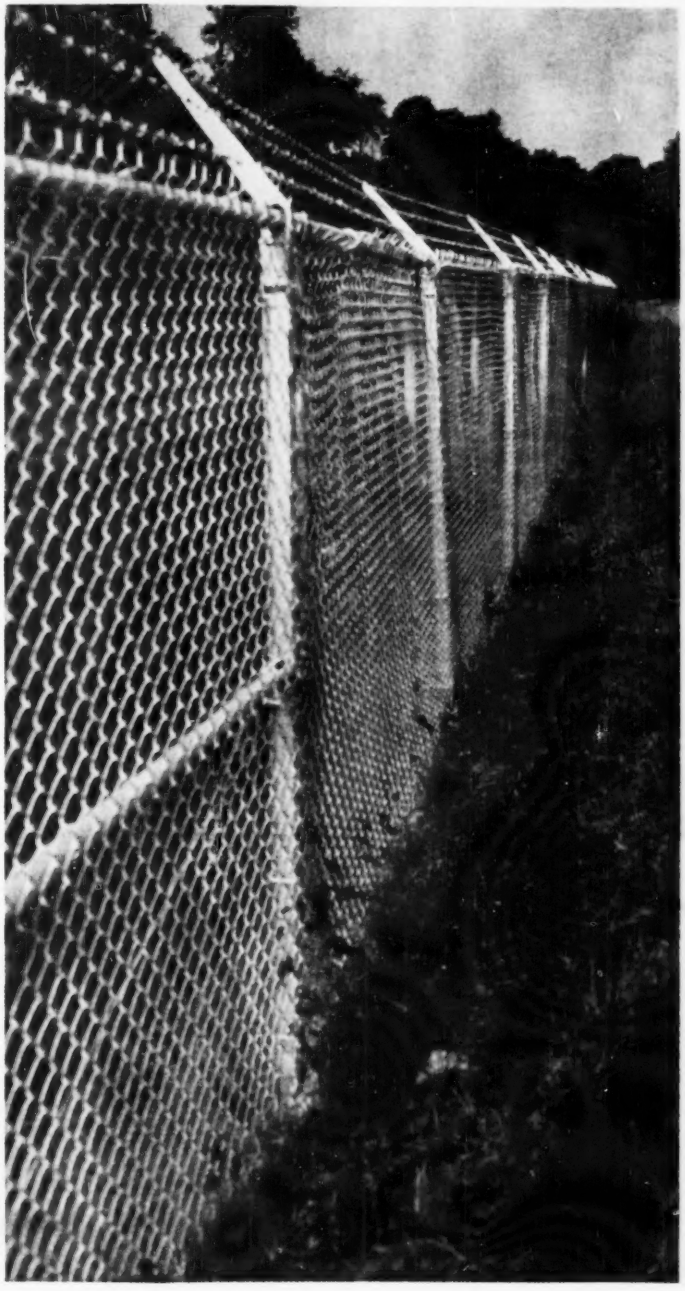
Because of the special vehicle and solvents selected for the formulation of the new coating, Roylac Aluminum, it dries upon four feet of travel from the spray gun nozzle to a cottony, nonadhering powder.

As an example, the wire fence in the photograph was spray coated with Roylac. The picture was made the following day. Note the absence of spray coating on the grass at the base of the fence.

In addition to this valuable feature, Roylac provides a superior and tightly bonded corrosion-resistant film with a bright aluminum finish, particularly effective exposed to acid-type fumes and salt or moist air.

The material is plasticized to provide a film of good flexibility and bonding tack, effective for sealing wood or other porous surfaces. With its non-reactive vehicle, the coating is excellent on galvanizing, zinc, aluminum, magnesium, steel and other basic metals. It has been accepted as an economical, fast-drying product finish coat. It covers from 600 to 800 square feet per gallon and dries to a tack-free film in 12 minutes. The material is also easily applied by brush.

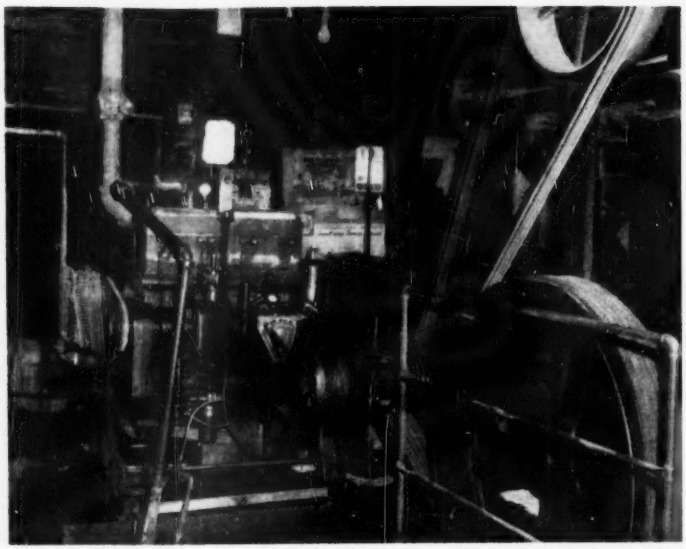
The manufacturer offers a free test sample, together with complete information upon letterhead request to the company.



• Appointment of N. C. Hays as west central district manager for the Davey Compressor Co., Kent, Ohio, is announced by J. T. Myers, vice President.

Mr. Hays will be in charge of company operations in New Mexico, Arizona, Utah, Colorado, Wyoming, Idaho, Montana, the Las Vegas, Nevada, trading area and the provinces of Saskatchewan and Alberta, Canada.

An alumnus of Denver University, Mr. Hays was formerly sales representative for the H. H. Nielson Company, distributor of Davey Compressors in Salt Lake City. He also previously served as sales representative for the Minneapolis-Moline Co.



Eighteen years of service and still going strong. Originally built for truck duty in 1934, this Model HA-400 Cummins Diesel powered a Model AB Mack until 1938, when it was traded for a new Cummins engine. The engine was then rebuilt and fitted for industrial duty. In 1938, the engine was installed at the St. Cloud Monument Company, St. Cloud, Minnesota, driving a 10x10 air compressor. Since that time the engine has operated eight hours a day, five days a week.

• The appointment of Mr. C. R. Boll, Jr., to the position of General Sales Manager, Cummins Engine Company, Inc., Columbus, Indiana, is announced by R. E. Huthsteiner, President of the Company.

According to the announcement, Mr. Boll will be responsible for Engine, Parts and Contract Sales, the Company Regional organization, Advertising and Sales Development.

Until his promotion, Mr. Boll was Manager—Engine Sales, a position he had held since December, 1948. His career at Cummins started in 1941 as a sales engineer

following his graduation from Purdue University.

During World War II, Mr. Boll served as an officer in the Signal Corps, receiving special training in electronics at the University of Chicago, Harvard, and M. I. T. In 1945 and 1946, Mr. Boll was a Staff Officer in General MacArthur's Headquarters, both in Manila and Tokyo, working on radio and radar counter-measures and civil communications problems.

Upon his return from service, Mr. Boll rejoined the Company, and in May, 1947, was promoted to Assistant Regional Manager, Great Lakes Region, with headquarters in Cleveland, Ohio. He served in this capacity until his appointment as Manager—Engine Sales in 1948.

● New Cummins General Manager. E. D. "Don" Tull has been named to the newly created position of Vice President and General Manager of Cummins Engine Company, Inc., at Columbus, Indiana. His promotion was announced by Irwin Miller, Chairman of the Board, and R. E. Huthsteiner, President of the Company.

Mr. Tull, a native of Columbus, has been with Cummins since 1928. In February of this year he was named Vice President of Personnel and Plant and recently was elected to the Company's Board of Directors. As Vice President and General Manager, Mr. Tull will be responsible for coordinating the work of the five divisions of the Company.

● New noses, chins, foreheads or other human features can be made from the breastbone cartilage of young steers. The xiphisternal cartilage for this purpose is prepared by Armour Laboratorites, according to a method developed by Sir Harold K. Gillies, plastic surgeon.

The breastbone cartilage has been used by Sir Harold in 144 operations during the last four years and also by American surgeons. It is equal, they report, to any human or synthetic implants now in use.

The cartilage is removed from the end of the steer's breastbone immediately after the animal is slaughtered. It is dropped into a sterile solution and next is carefully stripped of all adherent tissues. It emerges from this process as a soft, rubbery, white half-moon about for by two inches in area and up to a third of an inch thick. After further special treatment it is packed in a sterile solution in a glass jar ready for use.

The surgeon cuts off as much as he needs to mend a damaged nose or other feature, carves the piece to fit, and leaves the rest of the cartilage for the next operation.

The material does not set up foreign body reactions in the host, takes well, resists absorption and does not curl or warp. Another advantage of the material is its relatively low cost achieved through elimination of preliminary surgery on the patient or donor to get material for grafting, and also of the hospital cartilage bank for keeping such material from humans.

● Leaflet No. 852 by the Jeffrey Manufacturing Company, Columbus 16, Ohio, gives a detailed description of the Jeffrey Aerodyne Midget Fan, a self-contained Blower or Exhausting fan for ventilation through tubing.

• Caterpillar Tractor Co., of Peoria, Ill., has announced the execution of a long-term lease for a warehouse and parts processing plant to be erected on land immediately adjacent to the company's new plant site at York, Pa.

The one-story structure to cover about 300,000 square feet will be constructed by E. & S. Realty Company, Baltimore. It will have an adjacent outside concrete storage slab of about 72,000 square feet and ample parking space for employees. Caterpillar's 600,000 square-foot manufacturing plant, under construction on a 200-acre tract, is scheduled to start into limited production about July 1953, and to be completed by the end of that year.

T. R. Farley, vice president in charge of operations at York, said the proposed warehouse and parts processing plant should be of interest to the armed services and all Caterpillar distributors and customers on the Eastern seaboard and in Europe. There has been a growing need, he said, for such facilities strategically located with relation to the East in general and particularly to the ports of Baltimore, Philadelphia and New York.

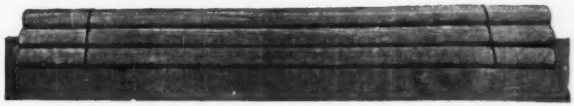
Caterpillar expects to employ some 1,000 persons in the manufacture of certain replacement parts at its York plant. Consolidated Engineering Company, Baltimore, holds the general contract for this unit.

EUCLID PUBLISHES LUBRICATION BOOKLET

A comprehensive presentation of the whys and wherefores of lubrication is provided in an attractive, well illustrated 26 page booklet published by the Service Department of The Euclid Road Machinery Co.

The publication not only details procedures for Euclid equipment, but discusses the fundamentals of lubrication. Characteristics of lubricants, their properties and tests, reasons for oil and lubricant changes, proper lubrication intervals and recommended procedures are also included.

Copies may be obtained by writing Euclid at Cleveland 17, Ohio.

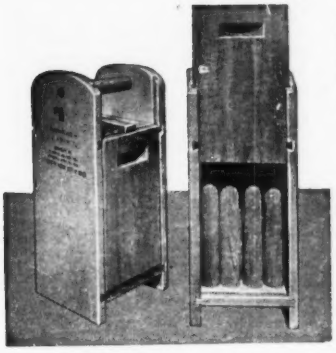


WOOD TAMPING POLES

For Tamping Explosive Shots: Poles are round made of Hardwood. Sizes to 10 ft. long.

5/8" Dia.	8c per lineal ft.
1" Dia.	12c per lineal ft.
1 1/4" Dia.	14c per lineal ft.
1 3/8" Dia.	16c per lineal ft.
1 1/2" Dia.	18c per lineal ft.
1 3/4" Dia.	28c per lineal ft.
2" Dia.	32c per lineal ft.

Special diameters and lengths can be furnished. These Poles meet the requirements of the New Federal Mine Safety Code.



SECTIONAL TAMPING POLES

These Poles are made of straight grained wood and are coupled together with removable wood pins inserted in place in recessed grooves by a rubber band and can be quickly connected and unconnected.

Couplers and Head Blocks are 4, 5, and 6 inches in diameter. Please specify size when ordering. Poles are 1 1/2 inches in diameter.

Head Blocks	4" Dia.	$3.50 Ea.
Couplers	4" Dia.	3.90 Ea.
Poles 12 ft. long	1 1/2" Dia.	3.60 Ea.
Poles 14 ft. long	1 1/2" Dia.	4.20 Ea.
Poles 16 ft. long	1 1/2" Dia.	4.80 Ea.
Poles 18 ft. long	1 1/2" Dia.	6.30 Ea.
Poles 20 ft. long	1 1/2" Dia.	7.00 Ea.
Poles 22 ft. long	1 1/2" Dia.	8.80 Ea.
Poles 24 ft. long	1 1/2" Dia.	9.60 Ea.

EXPLOSIVE BOXES: Made entirely of wood having no metal parts, tongue grooved and dovetailed construction with automatic lock using a rubber band for a spring, treated with paraffin to make moisture resistant. "Approved by the Pennsylvania Department of Mines." Sizes as listed based on 1 1/4" x 8" sticks.

Powder Box Prices are as follows:

No. 9 Powder Box	$2.55 Ea.	No. 25 Powder Box	$5.10 Ea.
No. 12 Powder Box	2.95 Ea.	No. 36 Powder Box	6.50 Ea.
No. 16 Powder Box	3.45 Ea.	No. 50 Powder Box	7.60 Ea.
No. 20 Powder Box	3.90 Ea.	No. 72 Powder Box	8.70 Ea.

Detonator Box Prices are as follows:

No. 6 size 2 1/2" x 3" x 6" inside $2.15 Ea. No. 8 size 2" x 2 1/2" x 8" inside $2.15 Ea.

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1. Bay City Shovel No. 65—1 1/4 yd. Diesel Eng., high front, wide cats, and 1 1/4 yd. Coal Bucket, new in 1948.
2. GMC—75 Kw Diesel Generator with automatic control.
3. Conveyor 39 wide—70 long. Low flight complete with 30 hp and starter. Right Price.
4. Haiss Cat. Truck loader, 1949 model.
5. International 18 A-TD Dozer, 1950 Model. TD 14 A Dozer, angle blade. TD 6 Dozer, angle blade. Cletac Dozer, angle blade.
6. 11 BU Joy Loader, new in 1949—Bargain.
7. Joy T1 and T2 Cat. Trucks—CP 574 Drills.
8. Goodman Shortwalls and 512 Trucks. Bargain.
9. Joy 8 BU, Myers-Whaley Loaders
10. Ironton 5 1/2 ton Battery Locomotive with Batteries and Charger. Price $2200.00.
11. STEELTITE COMPOUND for water spray systems, for Coal Dust Control. Effective - Efficient - Low Moisture - Low Cost.
12. WHS Ignition Rectifier 275-V Portable 3 cars. Brownie HKL Spot Hoist—New in 1945.
13. Cleveland Stopper with inpact Wrench and 1000 1 x 60" Roof Bolts.
14. Slope Hoist Comple with 75 H.P. Motor and Controller. Drum Good For 5,000 7/8 Rope.

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(1) **1201 Lima High Lift Shovel**, 13 ft. boom, 33 ft. sticks, 2 1/2 yd. bucket plus one spare bucket; 6NKH Waukashaw Diesel Engine; in good working condition.

(1) **60A Lorain Shovel**, one yard bucket, 22 ft. boom, 18 ft. sticks.

(1) **D-7 Cat Dozer**, cable or hydralic blade.

These three machines can be seen working on our job. Would like to sell as a complete stripping unit. Priced cheap for a quick sale, $40,000.00. We may help finance.

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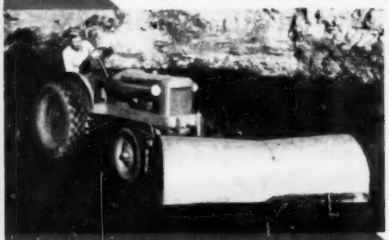

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